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W. J. JOHNSTON, President. F. J. PRATT, Treasurer.

T. A. RICKARD . . . . . EDITOR

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IT IS GIVEN to few men to do so many things in this world—and to do them so well—as Abram S. Hewitt. An engineer of marked ability; a shrewd and far-sighted business man; a manufacturer who in fifty years never had a strike to contend with; the practical head of a great educational institution; the executive of a great city the integrity of whose motives was never questioned; a legislator whose opinions on public questions were always heard with respect; above all, a citizen who was ever ready to aid in any movement in the public interest; he leaves a record which must command universal respect, and which may well be studied by younger men. He fully earned the title given him by one of his friends—the "first citizen of New York."

⚒

THE COLORADO Mine Operators' Association, of which Mr. Arthur Winslow is president, has our cordial good-will in its endeavor to bring about a healthier condition of affairs in the mining districts of Colorado. The association has taken a very decided stand on the question of lawlessness at Telluride, and it deserves the support of all those who desire the well-being of the industry which has built up the Rocky Mountain region.

⚒

GOOD PROGRESS is being made with the great undertaking to supply water to the West Australian goldfields. The Helena River, at Mundaring, has been entirely dammed by a concrete weir, which is 100 feet in height, 700 feet long, and has a width of 15 feet at the top with a base 85 feet wide. The water which will be stored by this dam will be pumped to Kalgoorlie and Coolgardie, a distance of over 300 miles, and at an elevation of a thousand feet higher. The pipe line has a diameter of 36 inches. Eight sets of pumping stations, with duplicate equipment, each set having a capacity of 2,800,000 gallons per day, will deliver the water to the gold-fields. On January 26 Sir John Forrest will mark the completion of this great undertaking by turning on the water. We trust it will prove a great stimulus to activity by affording a necessity, the want of which has sorely hindered these progressive regions.

⚒

THE LITTLE kingdom of Korea is almost the *Ultima Thule* of the mining world, but like the remotest corners of the globe it is awakening to the muffled roar of the stamp-mill. There will soon be 200 stamps in operation. Three mineral concessions have been given, and with international fairness, to American, English and German companies, respectively. This region has not only gold, but also coal and copper resources, which await the vivifying touch of the engineering hand.

⚒

IN OUR ISSUE of December 6 last, page 750, there was given an abstract of an interesting article by Mr. Herbert Kilburn Scott, on the "Iron Ores of Brazil." Through a clerical error it was stated in a foot-note to the article that the paper had been read before the Institute of Mining and Metallurgy. We wish to correct this now, and to state that the paper was presented at the last meeting of the Iron and Steel Institute, and that it is printed in full in the *Transactions* of that society.

⚒

THE SITUATION at Telluride, Colorado, is still unsatisfactory. The grand jury indicted a number of men, including the president of the Miners' Union, as accessory to acts of assault and murder, but, unfortunately, the court will not be in session until next June, so that there is ample opportunity for straw bail and an exodus.

Recently, the Union has ordered a fine of five dollars, to be followed by expulsion as a further punishment, to any member dealing with a boycotted tradesman. It has also "requested" the business men to subscribe to a fund for the starting of a new daily paper. This last step is planned solely to injure the Telluride *Journal*, a local paper which has had the courage to receive advertisements from boycotted tradespeople. The collapse of this paper, after a long and plucky fight, would be most regrettable. All the saloon owners have been brought into line with "subscriptions" to the cause of the Union. There is a striking resemblance between this method of getting funds and the forced loans of a South American republic, and we leave it to the average citizen to say whether the intelligent tyranny of a Spanish-Indian adventurer is, or is not, preferable to that of the brutal terrorism of a Slavonic-Italian-cum Irish conspiracy.

⚒

COMMENT HAS been made in some of the daily papers about the great importance of the abolition of the duty on coal to the Pacific Coast and the extent to which it will favor the imports of coal from British

Columbia and Australia into California. Most of these comments do not seem to be based upon any exact knowledge of the facts. It is well known that coal imported from British Columbia, Australia and elsewhere has played a considerable part in the supply of fuel for California, but the quantity has not increased recently, nor does there appear to be any probability of a further gain. Thus, the receipts of coal at San Francisco and other California ports, including domestic as well as foreign coal, fell off 389,000 tons in 1902 as compared with the previous year, although the year was one of prosperity and industrial activity throughout California. The receipts of British Columbia coal were 119,000 tons less than the previous year. While those from Australia, it is true, increased about 21,000 tons, or 12 per cent, this was due in a very large part to the unusually heavy shipments of grain from the Pacific Coast to Australia, which furnished a large supply of cheap tonnage for return cargoes of coal. In fact, in California the competition is not between foreign and domestic coal, but between coal and fuel oil. The use of oil for industrial purposes has increased with the liberal supply which is now obtainable in the state, and there is every prospect that it will continue to do so, unless there should be a serious falling off in the oil production, which is not probable at present. Oil is becoming the chief industrial fuel of California, and as long as it can be obtained at the prices now current the question of duty or no duty on coal will be comparatively unimportant.

⚒

IF THE REPORTS current about the discovery of an extensive deposit of iron ore in the Nipissing District of Ontario are correct, it is a matter of considerable importance. Explorations on the so-called iron ranges of Western Ontario have been in progress for several years with varying results. For the most part the deposits found outside of the Michipicoton Range have not appeared of special importance, but in the present case it is said that an ore-body has been found which promises to develop a very considerable quantity of 60 per cent ore generally free from phosphorus, titanium and other impurities. The property is located just north of the Sudbury nickel district, about 18 miles distant from the main line of the Canadian Pacific, and can be reached by the construction of a branch road, presenting no special difficulties. The haul to deep water on Georgian Bay will only be about 70 miles, or less than is now required from the Vermillion and Mesabi ranges in Minnesota.

Dr. A. P. Coleman, who has done a great deal of field work in Western Ontario, has spoken favorably of the indications shown at Moose Mountain, as the property is called. According to him, the deposit is of magnetite and interbanded with some silica. Prof. W. G. Miller, provincial geologist, who has also been interviewed by the Canadian papers, is somewhat more cautious in his expressions, but is inclined to think that there is a very large deposit of ore.

The property has been acquired by Mr. C. S. Osborn, of Michigan, representing a syndicate which includes among its members Capt. Joseph Sellwood, of Duluth; John W. Gates and others, of Chicago. It has been reported that this syndicate is really acting for the United States Steel Corporation, but this statement seems to be made more in view of future probabilities than of actual conditions. We hope to obtain further particulars very shortly.

THE SITUATION ON THE RAND.

The Transvaal war cost £212,000,000, or more than a billion dollars; it is not surprising, therefore, that the taxpayers in England should look to the cosmopolitan financial magnates of the Rand to help them to carry the burden. This has been done. On January the 17th it was announced that the leading financiers had subscribed $50,000,000, without commission or preferential security for the remainder of the Transvaal loan, the total of which is $150,000,000. This is practically the Rand's contribution to the expenses of the war. It will be followed by a further loan of $200,000,000, guaranteed by the British Government.

It was feared that the announcement of financial aid from the leaders of the Rand mining industry would be accompanied by the statement that the want of laborers would be filled by the introduction of Chinese. This danger has evidently been averted, for the present, at least. Suggestions have been made to import coolies from India, China and the islands of the Pacific; these are the natural results of the impatience caused by the fact that the Kaffirs in the region surrounding the Witwatersrand have been coming in very slowly. Fifty thousand are now at work, but 300,000 are needed to work the mines to their full capacity. White men are entirely insufficient in number and too expensive for common labor underground. As a consequence, the entire economic development of South Africa is arrested. There are more than five times as many blacks in the country as there are white men. The latter wants the former to work for him, but the Kaffir's sole idea is to put in a few months at the mines, return home, buy a wife or two, and loaf in sunny idleness.

Thus the labor problem is more important than the financial, for even the war tax will still leave the mining industry less burdened than it was under the Boers. The high price of labor outweighs the slight increase in taxation.

Among unbiased men on the spot, there is a general belief that with the raising of Kaffir wages to the figures which prevailed before the war there will be an increased influx of native labor and that as the unsettled feeling produced by recent hostilities passes away this increase will be accelerated. The patient effort to attract the Kaffir to the mines by fair treatment and slightly higher pay, if need be, is much more likely to contribute toward the future growth of this great region than such drastic measures as the importation of coolie labor from a foreign country.

⚒

THE MOTHER LODE.

IN THIS ISSUE appears an article on mining in California along what is known as the belt of the Mother Lode. We have published this contribution with especial pleasure because it comes to us from a mining engineer who, not being a resident on the Pacific Coast, has viewed his subject from the point of view of an onlooker. That the impressions he gives are favorable does not surprise us, for the region of which he writes saw the first lode-mining in California, it has been a great practical school of mines to scores of successful engineers, and it has been quietly productive during all the fluctuations of mining excitement in other parts of the world.

That tract which extends north and south along the seaward slope of the foothills of the Sierra Nevada, from Coulterville in Mariposa to the Cosumnes River, dividing the counties of Amador and El Dorado, is known as the Mother Lode. With a length of about 110 miles and a varying width of several miles, it covers a fissured strip full of gold veins and marked by an almost continuous chain of mines. It can be compared in its extent and importance to only one other district, the Witwatersrand, to the development of which it contributed in a marked degree by affording to engineers a training in the handling of large bodies of low-grade free-milling quartz ores.

It will not be surprising if this foothill country in California attracts again the attention which it won, say, fifteen years ago. The development of a very sound and conservative kind of mining business on the Rand should point the way to a similar evolution of industry in the original low-grade free-milling tract of America. Since the last burst of great activity in Californian mining there has been a relapse and a recovery. The first was emphasized by the ruinous effects of the debris legislation which stopped most of the hydraulic mining, but the subsequent recovery has been unobtrusive and substantial. During this interval much has been learned in that financial art—the buying of mines; it is realized that even the best property is likely to prove a poor bargain if you pay twice its face value, and now, with the aid of an all-round improvement in the technique of mining and metallurgical practice, such as the years unfailingly bring in a wide-awake, energetic community, there is reason to believe that the introduction of capital from the outside might not be handicapped by those childish blunders which disfigured the industry as it was carried on by the English and the Eastern companies that went to work, with more confidence than care, ten or twenty years ago.

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THE PROFESSION AND THE SCHOOL.

In a preceding issue we referred to the recommendations made by a committee of the Institution of Mining and Metallurgy, in London, to the Royal School of Mines. This episode is much as if a committee of distinguished officers, the veterans of many wars, were to make a visit to West Point or Woolwich in order to give advice to those engaged in training the young fellows destined eventually to take their places in the profession of arms. The worthiest economy is the utilization of experience. It is, however, a regrettable fact that, as a rule, the teaching staff of a School of Mines is apt to make but little use of the opportunities afforded for keeping in touch with former graduates, while on the other hand, the graduates are more likely to donate prizes or money to their alma mater than to give that which money usually cannot buy, the lessons of experience. The School of Mines of Columbia University has recently inaugurated the plan of occasional lectures to students by professional mining engineers and metallurgists; at Yale an effort is being made to get into closer touch with professional work and a well-known engineer has been put on the staff of the Sheffield Scientific School; at Harvard a number of alumni have agreed to serve as a committee of advice to the Lawrence Scientific School. These incidents bespeak a desirable development.

The professors of modern mining schools are rare-

ly so obtuse as not to see the advantages of keeping in close touch with the professions for which their students are being trained; they, as a rule, welcome the interest of former graduates as a compliment to themselves, a stimulus to the students and a link between the lecture room and the broad arena of life. In such centers as New York and London, where men foregather from every part of creation, it should be easy to get hold of a few engineers who are willing to give half an hour to an occasional brief talk before a class of mining students, and it might be made easier if the formality of a lecture gave place to a straightforward account of an interesting development in mining or milling practice, a bit of advice based upon experience, a suggestion as to the best line to follow in a new career. The senior class, about to start the real work of life, is likely to be especially keen on meeting men who have "done things," and in the malleability of their youth they afford material on which a high-minded man may be permitted to leave an impress likely to further the highest calls of citizenship.

In the past there has been a frequent tendency on the part of experienced engineers, even though they have themselves graduated from a technical school, to sneer at the academic teaching of the lecture room and to refer to good luck as having enabled them to become practical men in spite of their early training; such men feel quite out of sympathy with the teaching staff, they remember that a preparation for the real business of life formed no part of the old curriculum, and they wonder how the young fellows who are now being trained will ever be able to escape the pitfalls which are agape for the unwary. If unadulterated selfishness be a man's sole rule of conduct his ruminations will go no further, but we feel assured that with the advancement of mining as an industry there has been a commensurate improvement in professional ethics and professional public-spirit so that it is now possible to appeal to the good-will of engineers and metallurgists in behalf of the great training schools to which they themselves owe so much. The Anglo-American council of the Institution of Mining and Metallurgy has given a notable example in offering, and the Royal School of Mines in accepting, good advice. We hope that other schools will be encouraged to get into closer touch with professional men.

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MIGRATION AMONG ENGINEERS.

The migratory character of the profession is indicated in a striking manner by the membership of the American Institute of Mining Engineers. From the secretary's office we learn that in the course of the past year it was found necessary to make 2,250 changes of address in a roll of about 3,300 members. These changes were confined, however, to about 20 per cent of the names, indicating that there are about 600 men who are as nomadic as the Kirghiz of the steppes. Consulting engineers, the chiefs of smelters, specialists and others who have climbed to the higher rungs of the ladder of professional advancement are enabled to maintain a residence of comparative fixity, but the younger men—assayers, surveyors, assistants to managers, etc.—find that in the chances of this life there is a providence which like the policeman at a crossing, is always calling upon them to "move on." These men stay in one place on an average for only two years—not necessarily by reason of any lack of ability, for the change is due often to removal to a superior post elsewhere, and it may be due to a closing down of mill or smelter, or a sale, entailing a different ownership, or a consolidation, bringing with it a decrease in the staff.

Thus the young engineers and metallurgists—especially if they are mentally and physically alert—make a sort of technical pilgrimage, despite themselves, and generally to their advantage, for it means a wider knowledge of men and things, a broader experience and the breaking down of anything akin to insularity or provincialism.

On the other hand, the breaking of ties, whether of home or friendship, the uncertainty of residence, precluding the possession of many books, and the possible extremes of climate, trying to all but the robust, are in the aggregate a tax which our engineers pay to professional success. It merits a better return from the investing public and warrants much higher remuneration than is usually paid. They deserve well of the community; in an ideal republic such men would have provision made for them, such as is guaranteed to the soldier; for, after all, the engineer is on the skirmish line of civilization and deserves the consideration which the nations give so gladly to their soldiers and sailors.

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MARKET CONDITIONS.

The metal market continues, as a rule, strong and active and there is no cessation in the general improvement noted in our last week's report. Buying of copper continues freely and a number of manufacturers seem disposed to place orders for considerable quantities at current prices. The anticipation of lower quotations seems to be a matter of the past and the circulars issued by certain parties claiming the existence of large stocks of unsold metal have fallen extremely flat, very little notice having been taken of them. The origin and motive of these circulars are very well understood, and the exaggerations contained in them are too wild to merit serious notice. The figures published in our issue of January 3 are generally accepted as showing as closely as possible the actual situation of copper.

The production of copper as reported to Mr. John Stanton by the Associated Company is now complete for the year, the December figures having been received. This statement—which does not include the copper used in by-product sulphates which was added to our January statement—shows a total production in the United States of 295,656 long tons, of which 258,056 tons came from the reporting mines and 37,600 tons from the smaller mines and smelters. The increase over the corresponding report for 1901 was 30,401 tons, or 11.5 per cent. As we have heretofore noted, this gain really represents that of two years, the present production reflecting the condition which existed two years ago. The foreign reporting mines, which include all the principal European mines, showed a total production of 108,875 tons, the gain over 1901 being 8,631 tons, or 8.6 per cent. This figure is somewhat nearer the normal increase, which has been shown over a period of years. The exports from the United States, according to Mr. Stanton's statement, amounted to 168,053 tons, an increase, over 1901, of 77,687 tons, or 86.2 per cent. The increase in December, of 529 tons, over the November statement was somewhat unexpected, as production in the last months of the year usually shows a decrease.

It is announced this week that the Amalgamated Copper Company has withdrawn from the Copper Producers' Association and will no longer report to Mr. Stanton the yield of the mines which it controls. The association has taken no action as yet and it is somewhat uncertain how far this action will control the reports of production. If it should only apply to the Montana mines acquired by the company, it will be possible to estimate quite closely the output from time to time, but should it include also, as is possible, a number of important Lake and other mines, it may result in terminating the very useful reports of the association. The policy of secrecy and the concealment of its business, which has always been followed by the company referred to, cannot be too strongly deprecated. It is injurious to the trade in every way and is entirely against the principles which the JOURNAL has always advocated.

In the other metals there is little change to report. Tin continues in active demand and with quotations well maintained. Reports from abroad indicate comparatively little increase over the production last year, while there was a steady gain in consumption, and we are again approaching the condition of a few years ago when the current demand was to a greater or less extent supplied from accumulated stocks. The business in lead continues quiet, with about the usual demand and no change in quotations. Spelter remains strong, galvanizers and brass manufacturers being evidently disposed to buy well at current prices. In the iron and steel trade no special incident has marked the week just closed. The demand for foundry iron is somewhat less, and consumers have been satisfied by purchases of foreign pig. In finished material the chief points in the market at present are some heavy orders in plates and other shipbuilding material, a considerable demand for structural steel and numerous inquiries for girder rails for electric railroad enterprises. If these can be satisfied within a reasonable time it is evident that a great deal of electrical work will be done during the present year.

The Western coal market continues to be demoralized by difficulties in transportation, with an unprecedented demand for coal everywhere for manufacturing purposes. Railroads have been unable to deliver the coal as promptly as it is needed and the result has been a great deal of local trouble, and occasionally distress. Many of the accounts, however, are exaggerated by the daily press, and there can be no doubt that a serious effort is being made by the railroads to meet proper demands. As we noted last week, conditions have been emphasized by reason of extreme cold and stormy weather.

The Seaboard bituminous trade shows no material change, the demand continuing very strong and consumers, particularly at all-rail points, being unable to get necessary supplies. Speculative coal at New York harbor points continues to sell at high prices. The amount of coal arriving at tidewater is restricted by a poor car supply.

In the anthracite trade the demand for coal in all consuming territories is very heavy, although the milder weather is causing slight reductions in the prices asked by independent operators for coal at New York harbor points. Prospects at present are that there will be a considerable reduction from the

highest speculative price within a few weeks unless the weather should be unusually severe.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC?

To the Editor:

Sir.—M. Osmond uses the expression "hyper-eutectic steel" to indicate steel containing more than the pearlite ratio of 0.80 per cent of carbon, and "hypo-eutectic steel" to indicate steel containing less than that. In the same way he would no doubt speak of eutectic steel as steel containing exactly this pearlite ratio. This last, however, brings up a serious objection to the use of these expressions.

The eutectic, following Guthrie's original use of the word, is the most fusible alloy in a given series of alloys, or in a certain range of that series, and eutectic steel should therefore mean the most fusible steel. M. Osmond applies the term to steel of the pearlite ratio, not because that is the most fusible steel, but because it is the steel of the lowest transformation point, *i. e.*, he borrows this term "eutectic," which clearly referred to solidification, and applies it to phenomena of transformation within the already solidified mass. This is a very natural and at first sight proper course, but the serious objection to it is that steel of this composition is not eutectic in Guthrie's sense because it is not the most fusible steel, but very far from it. In point of fact, I have actually found much confusion to arise from this use of the term with students, and as a teacher I write this note to suggest a different term.

It appears to me that it would be well to indicate the fact that this steel is the steel of lowest transformation point as distinguished from lowest melting point, by using an adjective which refers distinctly to transformation points and does not refer to melting points, for it is by neglect of this that M. Osmond's expression "eutectic steel" leads to confusion. What we need then is some term which shall clearly indicate that the steel is of the lowest transformation point, and the next question is, what term shall we use?

We naturally turn to the Greek, but unfortunately there is no short Greek word to represent transformation. Eutectic means "well melting," and the corresponding term to express steel or other alloys of lowest transformation point might be either "eumetallactic" or "eumetamorphic."

Both of these words seem to be wholly unsuitable. "Eumetallactic" means literally "well changing," but then everybody would suppose the letters "m-e-t-a-l" referred in some way to the common English word "metal," and their reference to transformation would not be seen. "Eumetamorphic," on the other hand, is intolerably long and cumbersome. If we were to speak of "hyper-eumetamorphic steel" we should use shocking jargon.

Under these conditions, I propose that we turn to Latin, and I suggest the word "benmutic," which evidently means "well transforming," and therefore is quite parallel with Guthrie's term, "eutectic" or "well melting." The expression "benmutic steel" or "benmutic alloy" would mean the steel or alloy of the lowest transformation point, and it would not confuse the reader by needless reference to the melting point. In this case "benmutic steel" would be that with 0.80 per cent of carbon. Steel with less than this amount would be called "sub-benmutic" and that with more than this amount "super-benmutic." I can see no objection to the expressions, but I should be glad to hear how they strike your readers.

If this term was adopted, then the term "eutectic iron" should be held to refer strictly to iron containing 4.3 per cent of carbon, *i. e.*, the iron of the lowest melting point and "hypoeutectic iron" and "hyper-eutectic iron" should respectively refer the former to iron containing less than 4.3 per cent of carbon, and the latter to iron containing more than this amount.

There is another point in which the nomenclature of metallography seems to need an addition. Above the critical range, A_1 to A_2, the iron and carbon of steel unite to form a solid solution. When the steel is cooled thence this solution tends to break up into the condition of ferrite and cementite. If the cooling is slow this dissociation is complete, and the resultant slowly cooling steel consists of ferrite and cementite. If the cooling is rapid, then the change from solid solution into ferrite and cementite is incomplete, and the decomposition of the solid solution is more or less arrested. Different rates of suddenness of cooling give different stages of decomposition products, and to three of these stages definite names have been assigned by M. Osmond, viz., martensite, sorbite and troostite. We have the anomaly then of assigning definite names to the decomposition products of this solid solution, and yet having no name at all for the solid solution itself. After long experience in teaching this subject to many classes of students I have become convinced that it is desirable that the solid solution itself should have a definite name to facilitate description and discussion, and for it I propose "osmondite." It is indeed wrong that the name of one whom Stead has called the greatest of metallographic micographers, should not be represented in the nomenclature of the subject.

There is a widespread objection to the multiplication of these specific names for the different metallographic entities. This objection, however, is, I think, ill founded. It appears to me to arise from the fact that most metallographists are more familiar with chemistry than with the other branches of natural science. In chemistry specific names for chemical compounds are not necessary or desirable for the reason that the composition of the substance itself (sodium chloride, ferric oxide, etc.) is a sufficiently clear name for the substance. But in other branches of natural science in general this is not the case. In anatomy, botany, biology, petrography, and best of all, for a simile, in mineralogy it would be intolerable to try to get along without specific names. Their convenience is so great as to outweigh every possible objection.

We are in the infancy of metallography, and the number of different entities which are going to come into the discussions of metallographists, will in the future increase enormously. In many cases it will not be necessary to have specific names, either because the entity is unimportant, or because it can be sufficiently described by its chemical composition. But in the case of the solid solution of iron and carbon above the critical temperature a specific name, I am confident, is really urgently needed to facilitate teaching young metallographists and metallurgists the metallography of iron and steel. In our various institutions of learning taken together there are probably a thousand young men every year who ought to be given a general smattering of metallography of iron and steel. To adopt a specific name such as "osmondite," would greatly facilitate their studies and the labors of their teachers.

HENRY M. HOWE.

Columbia University, N. Y., January 10, 1903.

SECONDARY ENRICHMENT AT CRIPPLE CREEK.

To the Editor:

Sir:—In November, 1899, during the examination of a mine on Bull Hill, not far from the Pike's Peak Mine, I found in the lowest level, about 850 feet from surface, a streak of bluish quartz impregnated with tetrahedrite, the latter mineral forming from 20 to 25 per cent of the whole. It was apparently not associated with any other mineral. This streak was from 4 to 6 inches wide, and had been left on the hanging wall for a few feet before entering the breast. It assayed 0.48 ounce gold and 14.80 ounces silver per ton. The adjoining vein matter was impregnated with iron pyrite and assayed, for a width of 3 feet 6 inches, 0.32 ounce gold. No tellurides were found on this level, though more or less telluride ore had been shipped from several levels above.

I am informed no sinking has been done since. The vein is well defined and in trachytic phonolite.

I thought then and still think that this was a primary ore, and marked the upper limit of a new zone formed subsequently to the telluride zone above. I found in the mine no evidence of secondary enrichment.

F. A. MALINS.

DENVER, Colo., Jan. 14, 1903.

(NOTE.—Mr. Bancroft writes to say that the percentage of copper in the ores treated at the works of the United States Reduction and Refining Company is not 0.08 per cent, but 0.0039 per cent.—EDITOR.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Philosophy never rests. Its law is progress; a point which was invisible yesterday is its goal today, and will be the starting-post to-morrow.

The surest proof of the truth of scientific conclusions is the fact of their *not* being original so far as *one* person is concerned, and of their having become manifest to more than one mind, either about the same time, or successively, without communication.

Logical consequences are the scarecrows of fools and the beacons of wise men.

Arguments concerning the workings of nature usually regard nature as formerly parsimonious of time and prodigal of violence.

Those who refuse to go beyond fact rarely get as far as fact; and any one who has studied the history of science knows that almost every great step therein has been made by the "anticipation of nature"; that is, by the invention of hypothesis, which, though verifiable, often had very little foundation to start with; and not unfrequently, in spite of a long career of usefulness, turned out to be wholly erroneous in the long run.

Cleavage in rocks is regarded as being largely due to compression. It has been computed that in the slates of Penrhyn, in Wales, the absolute compression has been such as to reduce a width of 100 to one of 43, or to about one-half of their original volume.

That quartz is opaque is due largely to the myriad cavities which it contains. These cavities may be vacant, but often they contain water and liquified carbonic acid gas. Sorby discovered the fact that they may be so microscopic in size that a thousand millions of them in a cubic inch is not unusual, and the enclosed water often constitutes 1 to 2 per cent of the volume of the quartz.

The sole producer of aluminum in the United States is the Pittsburg Reduction Company, operating the Hall patents. In 1901 the production amounted to 7,150,000 pounds. The price varied from 37 cents in small lots to 33 cents per pound in ton lots.

In the year ending November 30, 1889, the Mount Morgan Mine, in Queensland, produced 75,415 tons, yielding 323,542 ounces, 13 dwts. 13 grs., worth $6,657,424, while the total expenses were $1,138,849, permitting of the payment of $5,500,000 in dividends. The yield per ton averaged 4 oz. 5 dwts. 4 grs., and the profit represented 83 per cent of the gross output. This is probably the most satisfactory mining on record.

ABRAM STEVENS HEWITT.

Abram Stevens Hewitt, who died in New York on the 18th instant in his 81st year, was a man whose long life, varied activities and many services to industry and to the public had earned him a great and enviable reputation. He was born in Haverstraw, N. Y., in 1822 and was the son of an Englishman who had come to this country in 1790 as representative of the English firm of Bolton and Watt, and who later assisted in putting up the first steam-engine works in the United States. He had accumulated a considerable estate but lost his property, chiefly through fire, and at the time of his son's birth was a poor man.

Abram S. Hewitt passed a portion of his early days on a farm owned by his mother in Rockland County, but as he grew older he attended the New York public schools and after passing through Columbia College he graduated in 1842, supporting himself while at college by teaching and by other work. After graduating he served for a couple of years as an instructor in the college but was obliged to abandon this work on account of trouble with his eye-sight. In 1844 he was able to make a visit to Europe, accompanied by his classmate and intimate friend, Edward Cooper. On the return voyage, they were shipwrecked, and Mr. Hewitt reached New York in an almost penniless condition. Almost immediately, however, he resumed the study of law, which he had begun while still connected with the college, and was admitted to the bar in 1845; but he did not practice, for at that time he was persuaded to enter into a business partnership with Edward Cooper; and Peter Cooper turned over to the new firm the iron branch of his business which was not then in a very prosperous condition. The firm of Cooper & Hewitt then formed has continued to exist ever since and was a pioneer in the establishment of many branches of iron manufacture in this country. It was the first firm to manufacture iron girders and shapes, and the first to introduce the open-hearth steel process devised by Dr. Siemens and M. Martin. The firm, at a later period, controlled the Ringwood Mines and blast furnaces and the Pequest furnaces in New Jersey, the rolling mills at Trenton and Durham, and had at one time as many as 5,000 employees. From the first the firm was progressive, always ready to adopt improvements and to launch out into new branches of business, and its members assisted in some of the most important developments of the iron trade. Another most remarkable fact is that in all its long history the firm of Cooper & Hewitt never had a serious difference with its employees and no strike ever occurred at any of its works. It is also noteworthy that its operations have extended through good and bad times, and a statement was made by Mr. Hewitt himself, under oath before a Congressional Committee, that during the years of depression following the panic of 1873, business was carried on for several years at a loss of nearly $100,000 a year, chiefly for the purpose of furnishing employment to the men in its service. These losses were covered by subsequent years of prosperity and the members of the firm succeeded in accumulating considerable fortunes, although they would hardly have been reckoned wealthy by the modern multi-millionaire standard.

During the War the firm of Cooper & Hewitt rendered essential services to the Government by the manufacture of gun and mortar carriages and other work for the Army, and in 1862 Mr. Hewitt made a special visit to Europe to study the manufacture of gun-barrel iron, which was afterward carried on at his works during the war. While in Europe also, it is understood that he made important purchases of arms and war material for the Government, although at the time these transactions were necessarily carried out in secret. In 1867 he was appointed one of the United States Commissioners to the Paris Exposition and had special charge of the subject of iron and steel. His report to the Government, on the progress of the manufacture of that metal, was a document of great importance at the time and was translated into many European languages. It was generally praised for its thoroughness.

In 1855 Mr. Hewitt married a daughter of Mr. Peter Cooper and from that time he was closely associated with Mr. Cooper in his philanthropic and educational schemes. When Mr. Cooper devoted his fortune to the establishment of the Cooper Union in New York, Mr. Hewitt joined with the other children and heirs in this appropriation of the Cooper property and for many years after Mr. Cooper's death, he gave liberally his time and money to carry out the plans of the Union and to maintain its usefulness.

Mr. Hewitt joined the American Institute of Mining Engineers very soon after its first organization and in 1876 he served as president of the Institute. His retiring address on "A Century of Mining and Metallurgy in the United States" attracted favorable criticism both at home and in foreign countries. He served as president of the Institute a second time in 1889. In the following year, on the occasion of the visit of the members of the Iron and Steel Institute of Great Britain, to this country, his services in the

ABRAM STEVENS HEWITT.

improvement of iron and steel manufacture and the admirable work he had done were fully recognized. The Iron and Steel Institute awarded him the Bessemer Medal, the highest honor within its gift.

With all his varied business activities Mr. Hewitt was never unmindful of his duty as a citizen and for many years took an active part in politics. He rendered much assistance to Samuel J. Tilden in breaking up the Tweed "Ring" in New York and was practically the head of the reform movement in the city. For a time he was Chairman of the Executive Committee of the Reformed Tammany Hall and in 1874 was elected to Congress from one of the city districts. He was re-elected in 1876, but in 1878 he declined to run because his partner, Mr. Edward Cooper, was then a candidate for mayor. In 1880, however, he was again elected and served until 1886. In that year he was elected mayor of New York and his service in Congress was closed. As a member of the House of Representatives Mr. Hewitt was noted for his readiness in debate and his great fund of information on all industrial and financial questions. He was a steadfast friend to the scientific departments of the Government and was especially an earnest advocate of the United States Geological Survey. In 1878 he served as Chairman of the Congressional Committee on the Grievances of Labor, the sessions of which attracted a great deal of attention at the time. In 1876 he was Chairman of the Democratic National Committee and took a prominent part in the proceedings which followed the contested presidential election of that year. He acted in Congress to a great extent as the personal representative of Mr. Tilden. As Mayor of New York Mr. Hewitt rendered important services to the city. He first suggested the Rapid Transit system which is now being carried out, seventeen years later. It was due chiefly to his farsightedness that the city acquired the great tracts of land which are now being developed for one of the finest systems of public parks in existence, and he first suggested the importance of establishing smaller parks as breathing places in the poorer sections of the city. In 1888 he was a candidate for re-election but was defeated. During his administration the old corrupt element had gained control of Tammany Hall and aided by the action of the equally corrupt Republican machine, they succeeded in defeating him. It was remarkable, however, that with the machines of both parties against him, he received over 70,000 votes.

Soon after the election of 1888, Mr. Hewitt made another trip to Europe where he was everywhere received with marked respect. After that he ceased to take a directly active part in politics, although he never hesitated to express an opinion on political and other questions in all of which he continued to take a deep interest.

As we have already noted, notwithstanding his many activities, Mr. Hewitt maintained his interest in the work of the Cooper Union. He gave much time and thought to its management and was for many years the leading spirit in the Board of Trustees. He aided the work of the Union by liberal gifts of money also and almost the last work of his life was in connection with plans for its extension.

Although not a railroad man, Mr. Hewitt was interested in some railroad ventures. After the collapse of the New York & Oswego Midland in 1874, he was appointed receiver of the road, and helped in its re-organization as the present New York, Ontario & Western. He also re-organized the Montclair Railroad, in which he was directly interested through its connection with his Ringwood property. He had some mining interests in Colorado; while in Montana he was one of the original owners of the Great Falls Smelter, afterwards consolidated with the East Helena Works. He was also interested in the Missouri River Power Company, which built the electric plant at Canyon Ferry in Montana, from which power is transmitted to Butte and other points.

His varied business interests are shown by the many companies with which he was connected, outside of those which he controlled and managed directly.

At the time the United States Steel Corporation was organized, it was understood that Cooper & Hewitt received a very advantageous offer for their properties, to be merged into the new consolidation. The offer was declined, mainly because the firm desired to protect their employees, many of whom had been with them for long periods, against the changes which might follow the consolidation of plants.

His membership in the American Institute of Mining Engineers has already been referred to. He was either an active or honorary member of many other technical societies, and took special interest in the American Geographical Society. He belonged to several clubs in New York. He served also as a trustee of Columbia University, a trustee of the American Museum of Natural History and the Metropolitan Museum of Art.

Mr. Hewitt had, without deserving it, the reputation of being brusque, almost gruff, in manner, and of repelling those with whom he came in contact. He was a very nervous man and so extremely quick of perception that he did not always make allowance for the slower mental processes of others. Always a very busy man, he was apt to resent what he considered a waste of his time. Matters properly presented to him, however, always received due consideration. The writer at one time had occasion to interview Mr. Hewitt several times, and always found him ready to give information and to listen, provided the matter in hand was fully and concisely presented.

In recent years he received many honorable recognitions of his work. In 1901 the Chamber of Commerce of New York presented him with a gold medal in recognition of his services to the city, in connection with public improvements, especially the

rapid transit system. On his eightieth birthday he received many testimonials, and many eminent citizens joined in doing him honor, in a way seldom accorded to a living man.

His latest public utterances were in opposite directions, but both characteristic. One was the thoroughly appreciative and admirable letter which was read at the testimonial dinner given to John Fritz; the other was the vigorous letters on the anthracite coal strike which were published last fall, in which he insisted that the operators must fight it out, in order to defend the fundamental principles of our institutions against the tyranny of the unions.

STATIC ELECTRICITY APPLIED TO ORE DRESSING.

By W. G. Swart.

In February, 1901, letters patent were granted Lucien I. Blake, professor of electrical engineering at the State University of Kansas, and Lawrence N. Morscher, of Neodosha, Kansas, graduate student at the Kansas University, for a process of ore separation and apparatus based thereon. Briefly stated, the method consists in bringing a mass of ore particles into contact with a statically charged metallic surface. Such particles as possess relatively high conductivity are instantly repelled, while those of low conductivity are not repelled until sufficient time has elapsed to allow them to be pulled out of their original path and caught in a separate receptacle, thus effecting a separation from the conductors.

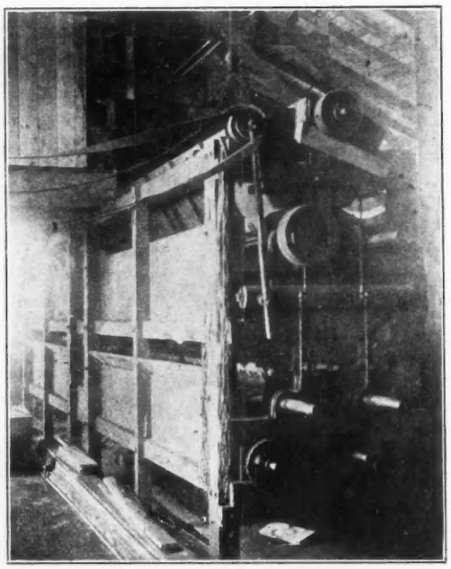
For a considerable period prior to the issue of these patents a machine had been in successful operation in Denver, working on miscellaneous ores, and in many cases with notable results. This machine has since been simplified and compacted and the details improved until it is now doing steady and satisfactory mill-work.

It is found by experiment that most of the sulphides and many of the other compounds of the valuable metals possess high conductivity, while the gangue consists largely of non-conducting material such as quartz, lime, etc. There are exceptions on both sides: The compounds of zinc, for example, are non-conductors, thus allowing a separation to be made between pyrite, galena and chalcopyrite on the one side, and zinc blende on the other, with no preliminary roasting, dryness being the only requisite. Magnetite and pyrrhotite may also be separated from blende. It is immaterial whether the blende be the "rosin jack" of the Joplin districts or the "black jack" of Colorado, the action is identical. Since this separation is mechanical and not chemical, the combined iron cannot be taken from black jack, but only such as is removable by separation of the crystals or particles.

So little has been done toward applying static electricity to commercial uses, and so little is known of its requirements in handling, that it has been no easy matter to work out a successful machine. The problems of proper distribution of the electric charge over the several parts of the machine and the successful insulation of high voltages in the face of dust, moisture and working conditions generally, are but two of the many solved. A simple means of controlling the effect of violent fluctuations of the static charge has been found, its only disadvantage being a slight decrease in unit capacity of the machine. The voltage has gradually been reduced from 250,000 until now perfectly satisfactory work is being done at from 10,000 to 20,000 volts, representing a spark from ⅛ to ¼ inch in length. A static generator has been devised by Prof. Blake and Mr. Morscher, constructed almost wholly of metal, using no glass whatever, self-exciting and able to run continuously in the open air without regard to atmospheric conditions, and with no more attention than an ordinary dynamo receives.

The separating machines, as at present constructed, have a nominal capacity of from 12 to 15 tons per 24 hours, working on blende concentrates at 30 mesh. As in most methods of ore dressing the capacity is largely governed by the mesh, coarse material passing through rapidly while fines go more slowly. The Blake-Morscher machine works well on some material at 6-mesh and will also handle material at 200-mesh with but slight change of construction or adjustment. As in other methods, sizing improves the products, but close sizing is not essential nor even desirable. On an 8-mesh jig concentrate a sizing at or near 20-mesh will usually give the best results, coarse and fine being handled separately on the same machine, which is built double for the purpose. The standard machine is a double one 24 feet long, 41 inches wide and 81 inches high, using about one horse power. This latter covers generation of the static charge and is the total power consumed. The machine is constructed chiefly of wood, there being no complicated or expensive parts, and but few wearing parts. As typical of the work accomplished I give the following results from my record, taking fair sized lots rather than hand samples. One peculiarity of the machine is that it has invariably done better work in quantity than was indicated by preliminary hand samples.

On the mixed sulphide concentrates of the Missouri-Kansas district, consisting of rosin zinc with a greater or less admixture of pyrite and galena, the



ELECTRIC SEPARATOR.

machine does its best work, as far as tests have gone. I select the following run from among many:

Ore—Joplin jig concentrates, bought in the open market at Joplin. Weight—482 pounds. Mesh test—6 to 8-mesh, 8.22 per cent; 8 to 12-mesh, 6.85 per cent; 12 to 16-mesh, 15.07 per cent; 16 to 20-mesh, 12.93 per cent; 20 to 40-mesh, 24.35 per cent; 40 and finer, 32.57 per cent. There is thus 43.97 per cent coarser than 20-mesh and 56.92 per cent finer. This material put over the Blake-Morscher separator without sizing or roasting, at the rate of 16.11 tons per 24 hours. Assays and weights of separated products are shown below:

Metal.	Original Material.	Iron Concentrates 18.22% of total weight.	Clean Zinc Blende 80.21% of total weight.
Zinc	49.20%	3.60%	60.69%
Iron	9.62%	39.24%	2.02%
Lead	2.28%	8.89%	trace
Silica	4.60%	5.00%	3.10%

Remarks—By "silica" is meant "insoluble residue." A loss of 1.57 per cent in weight is due to dust, samples taken during run, etc. Any copper present is thrown with the iron and lead. Sizing this material at 20-mesh, putting the fine and coarse over separately and combining the final products, gave better results, the clean zinc product carrying 61.81 per cent zinc.

On the Colorado "black jack" ores I give the following illustration: Ore—Leadville zinc and iron middlings. This Leadville crude ore is a solid mixture of sulphides of lead, zinc and iron, with practically no gangue. This is crushed to 30-mesh by rolls and concentrated wet on Wilfley tables, which take out the greater portion of the lead, at the same time discarding a portion of such silica as may be present. The remaining middlings product, consisting of pyrite, pyrrhotite and black jack, which in this case is a mixture of blende and marmatite, is dried and put over the electrical separators. The weight was 2,958 pounds. The mesh test showed 30 to 60-mesh, 33.8 per cent; 60 to 100-mesh, 28.50 per cent; 100 and finer, 38.2 per cent; 17.8 per cent passed 200-mesh. This material was put over the Blake-Morscher separator without roasting or sizing, at the rate of 12.83 tons in 24 hours. Assays and weights of separated material are given below:

Metal.	Original Material.	Iron Concentrates 47.90% of total weight.	Zinc Blende Product 50.88% of total weight.
Zinc	30.37%	8.14%	51.18%
Iron	20.14%	35.14%	8.80%
Lead	4.60%	9.05%	0.60%
Silica	3.30%	4.60%	2.70%

"Silica" is "insoluble residue." A loss of 1.22 per cent of total weight is accounted for in dust, samples taken during run, etc.

At the works of the Colorado Zinc Company at Denver one of these machines has been steadily doing this same class of work for some little time, and others are to be put in shortly there and elsewhere. The owners of the patents are careful, conservative men, preferring to go slowly with such an innovation, hence publicity has not been sought but rather avoided.

The machine is not confined in its operations to ores of zinc. All metallic substances, most sulphides and arsenides, and some carbonates and oxides are thrown out of a siliceous or limy gangue, in many instances the extraction being very high. This is particularly true of the sulphides of copper.

The machine as ordinarily constructed, makes no middlings; the finally separated products contain all the material originally charged. It can be arranged, in the case of coarsely crushed ores, to deliver a middlings product for re-crushing when necessary.

Considering the fact that here is a machine low in first cost and with a nominal operating expense, that it separates materials without regard to their specific gravity, that it works well at any mesh between 8 and 200, that no roasting of sulphides is necessary, that no water is required, that no piece of the machine weighs 100 pounds, that any intelligent mill-man or mechanic can build one and keep it in repair, it is not too much to say that these results are remarkable and a valuable addition has been made to the science of metallurgy, for which due credit should be given to Prof. Blake and his associates.

The photograph accompanying this description shows the machine at the Colorado Zinc Works in Denver.

SILVER SHIPMENTS TO THE EAST.

The shipments of silver to the East for the year 1902 are estimated by Messrs Pixley & Abell, of London, as below, in sterling values:

	London.	San Fran.	Totals.
British East Indies..	£7,074,970	£304,500	£7,379,470
China	490,335	1,431,990	1,922,325
Japan	46,500	.....	46,500
Totals	£7,611,805	£1,736,490	£9,348,295

At the average price for the year these values represent approximately 93,240,000 ounces of silver. In all 81.4 per cent of the total shipments were from London, and 18.6 per cent from San Francisco. The shipments from San Francisco included £1,449,390 in bar silver and £287,100 in Mexican dollars. In the exports to India last year there ware £282,000 consigned direct from San Francisco to Bombay, the first large shipments of the kind.

SILVER MINING AND SMELTING IN MONGOLIA.*

By YANG TSING FOO.

The Jehol silver mines are situated about 45 miles northeast of Jehol, the capital of Mongolia. They embrace two mines, 5 miles apart—the Ku Shan Tze and the Yen Tung Shan. They were first worked by natives 50 years ago, about the time when mining was so flourishing in other parts of the world—for instance, in California and Australia. The upper part of the vein is galena mixed with iron-stone, and is 2 to 4 feet thick. At lower levels the vein is composed of silver-lead running between quartz-porphyry. Limestone, talc and black shale, colored by graphite, are found in other parts of the mine. Crystalline limestone is found a mile northeast of Ku Shan Tze. Granite exists underneath the Yen Tung Shan Mine.

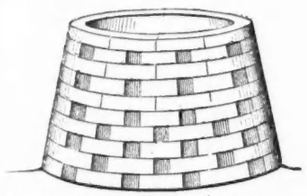


FIG. 2. Mongolian Roasting Furnace.

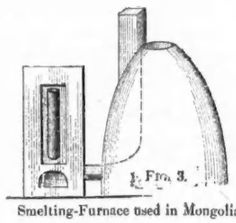


FIG. 3.

Smelting-Furnace used in Mongolia.

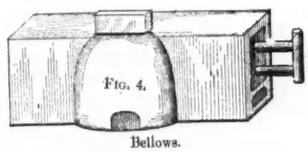
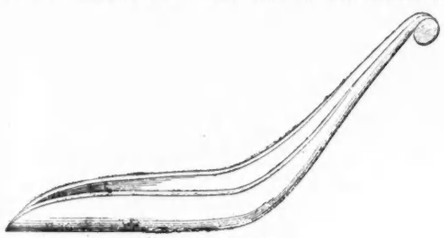


FIG. 4.

Bellows.

SILVER SMELTING IN MONGOLIA.

The native method of working the mines is most primitive. The same method may have been employed a thousand years ago. A small inclined shaft, 4 by 4 feet, is sunk through the vein-stuff where the appearances are most favorable. Another shaft is sunk 60 to 90 feet away, for ventilation. The shaft follows the vein in a zig-zag fashion in whatever direction the vein appears to be richest. Timber is used only in soft ground. Where the ground is hard, the roof is cut into an arch-form. In some places, instead of using ladders, steps are cut in the rock, just sufficiently wide to hold one foot. The deepest native workings are 400 feet below the surface. As the workings are above water-level, very little water is encountered. The water in the bottom of the workings is carried up to the surface in willow buckets by boys. When the water is abundant and requires several men, each shift, to drain the mine, sumps 3 by 2 feet are made every four or five feet along the inclined shaft. Men are placed at every sump to bail up the water to the next higher sump, and so on to the surface. Although labor is cheap in China, this method of draining a mine is very expensive. When 50 or more men are employed in bailing water from one mine, it would be much more economical to use steam pumps. Formerly black powder was used for blasting. Dynamite was introduced by European engineers in 1889. Since then, the miners will not employ any ordinary explosives, but only dynamite, in hard rocks. Where the ore is rich, the drill and hammer are generally used for picking out the ore. Blasting is resorted to where the ore is poor. Boys carry the ore up to the shaft mouth in round, shallow willow baskets.



Concentrating-Pan.

FIG. 1.

The miners do not receive any regular wages. The owners of the mine supply them with board and lodging, and they receive a part of the proceeds of the smelting. If the ore is worth 150 to 200 ounces a ton, each miner may get $20 to $30 a month. In case the ore is poor, containing less than 80 ounces a ton, it would only pay for the fuel used in smelting, and for the men's board and the explosives. At one time, when a company was formed to work the mines, the company collected 30 to 40 per cent of the proceeds of the smelting, according to the richness of the various workings; and the contractors received the balance as payment for the expenses of mining the ore and smelting it, including the explosives, tools, fuel and the miners' wages. The company had only to look after the general drainage of the mine and the timbering of the main levels. The highest output of silver was in 1894, and amounted to 140,000 ounces. The yearly average is between 80,000 and 100,000 ounces.

The ore as it comes out of the mine is first dressed by breaking it into small pieces about 1½ inches square and picking out the waste rock. The waste ore is then concentrated by washing in a spoon-like pan, as shown in Fig. 1. The water used for washing is mine-water pumped from the shaft. It is allowed to run into ditches about 4 feet wide, 3 feet deep, divided into compartments 5 feet long, and lined with timber so that the sides will not cave in. The pan floats in the water, is held by both hands, and a wavy motion is given to it. The heaviest particles settle at the back or bottom of the pan. The dressed and concentrated ore is then roasted in a primitive roasting furnace. It is simply a round wall of blue bricks, perforated at intervals to allow the escape of gases, as shown in Fig. 2. A space 3 feet wide is left open for a door. When the furnace is charged full, the door is built up. The bottom of the furnace is composed of wood ashes, one foot deep. The furnace is 5 feet high and 6 feet in diameter. A layer of charcoal is first laid in the bottom of the furnace, then a layer of ore, then a layer of charcoal and another of ore, and so on, till the furnace is full. It requires a week's roasting before the ore is sweet.

When cold, the roasted ore is transferred to a small smelting furnace, as shown in Fig. 3. It is built of sun-dried bricks, and is 3 feet high and one foot in internal diameter, cone-shaped, and open at the top, so that the ore and flux can be fed in. Inside of the furnace there is a protrusion, so that the blast may be directed toward the ore. The bellows consists of a square box of wood 4 feet by 3 feet by 1¼ feet, with a valve at each end, as seen in Fig. 4. It is worked by two men pulling a rope on each side of the bellows. The furnace is dried by heating with charcoal the night before using. The bottom is lined with wood ashes. A layer of charcoal is first put in, and then a layer of ore mixed with a proper proportion of flux, which is composed of old cupel-bottoms containing about 80 per cent of lead oxide. The blast is put on. Ore and flux are added from time to time, till there are about 100 pounds of silver-lead in the bottom. The slag is taken out through a hole near the bottom of the furnace. When there is sufficient lead in the bottom, water is poured into the furnace to quench the fire and cool the silver-lead. A big hole is made at the bottom of the furnace, and the lead is extracted in the form of a round cake.

It is cleaned and transferred to a crude cupel furnace, as shown in Figs. 5 and 6. The cupel furnace is about 4 feet long, 3 feet wide and 2½ feet high, and built of rough mud bricks. These furnaces are located in groups of a dozen or more, as occasion may require. In appearance they resemble the adobe ovens used in Mexico. The cupel proper, or muffle, is 18 by 12 by 8 inches. The cupel bottom, Fig. 6, is composed of fine sifted wood ashes collected from kitchen fires. A pile of ashes is dumped on the ground, and made into an oblong shape. It is hardened by pressing on it with one foot. The silver-lead is wrapped in coarse paper and placed on top of the ashes. Then a muffle is made over it by forming an arch with mud bricks. Charcoal is piled on top of the muffle and ignited. Mud mixed with straw is smeared over the charcoal, leaving a hole in the top for ventilation. The complete cupellation of 100 pounds of lead takes about 10 hours. When the silver brightens, water is poured on, and the silver is extracted with tongs, washed and cleaned with brushes. It is then cut up, and is ready to be made into sycee-shoes, which weigh from 5 to 50 ounces each. The fineness of the silver is 995.

It is a curious fact that almost every one in the neighborhood of the silver mines has some crude method of extracting silver from galena. All the stolen ores are smelted by the wives and children of miners. The smoke from their blast furnaces often give a clue to the men sent out to arrest the people who smelt ores in secret.

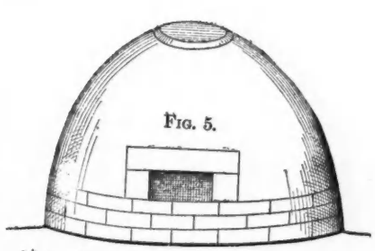


FIG. 5.

Mongolian Cupel-Furnace, Front Elevation.

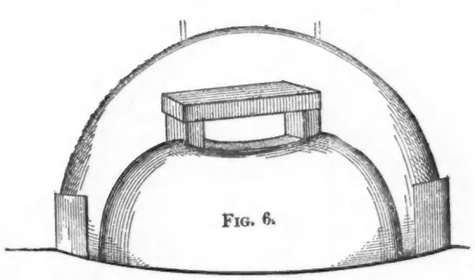


FIG. 6.

Cupel-Furnace, Showing Cupel in Interior.

SILVER SMELTING IN MONGOLIA.

PRECIPITATED SULPHIDE OF ARSENIC.—Considerable sulphide of arsenic is obtained in the refining of sulphuric acid, made from arsenious ores, which in the United States at least is a useless product. According to the *Mineral Industry*, VII, 57, the Pennsylvania Salt Manufacturing Company at its works at Natrona, Pa., recovers in this way about 150 tons of arsenic sulphide per annum and the Graselli Chemical Company at Cleveland, Ohio, about 140 tons, but at both places the product is buried in the earth to get rid of it. J. E. Riley and J. Barnes in British patent No. 25,444, of December 13, 1901, propose to recover both arsenic and sulphur by heating the precipitate to 160° C. for some hours with about its own weight of strong sulphuric acid. The floating scum of sulphur is removed and washed, and the acid liquor is concentrated to obtain crystallized arsenious acid.

*Abstract of a paper read before the American Institute of Mining Engineers.

RECENT DEVELOPMENTS ON THE MOTHER LODE.

By Ernest R. Woakes.

A recent visit to the Mother Lode District of California has convinced me that most people outside of California are quite unaware of the great mining activity in that region. Mines that were opened up thirty years ago are still working and paying dividends. It is also a fact, of far greater interest and importance to the mining industry, that many mines which had been worked to a depth of over 1,000 feet, and were abandoned, owing to impoverishments or the pinching of their ore-shoots, have of recent years been pumped out, and the old inclined shafts continued down to depths of over 2,000 feet, while others have started new vertical shafts, to sink to depths of 3,000 and even 3,500 feet, with the intention of opening up deep levels.

The general features of the geology of the Mother Lode are simple. A belt of black slate, locally called the Mariposa slate, runs with great persistence through the country in a general north and south direction, along the western slope of the Sierra Nevada. This black slate belt varies in width from a few hundred feet to over a mile, and can be traced through four or five counties. The quartz veins are found almost invariably in this black slate, sometimes paralleling each other. In some instances the vein follows the contact of slate and diabase, the latter rock being locally known as "greenstone." Accompanying the quartz there is usually a soft black gouge. The slates are much crumpled up and slickened, there is every evidence of great movement having taken place subsequent to the deposition of the ore. So persistent are these characteristics of the Mother Lode that should a miner have his black slate, his gouge and a showing of quartz, no matter how low-grade, he is willing to stake all his own and his friends' money on the chances of finding a payable ore-shoot. The proof of the practical value of this theory is clearly evident from the number of mines having these conditions that have proved profitable.

This local confidence in the permanence of the ore-bodies on the Mother Lode also accounts for the quiet and unobtrusive manner in which the mines are being worked. The stock is all held by local people who work the mines solely for the dividends they yield. The hotels and pleasure resorts of California are well stocked with people who are quite content to draw their regular monthly dividends from properties situated in this famous old mining region.

The days of high-grade ore have passed away, and the mining men of California are solving the question of how to make large low-grade ore-bodies pay when occurring at depths of 2,000 feet and over. Four-dollar ore will pay dividends on a 40-stamp basis, and $6 rock is regarded as comparatively rich.

The conditions are, of course, unusually favorable to cheap mining; wages and supplies are reasonable, timber is not dear. For power there is a choice between crude oil fuel at $1.50 per barrel of about 42 gallons or the electric current as supplied by the Standard Electric Company at $6.50 per horse-power per month. As a rule, the mines are exceedingly dry, baling with large water tanks for a few hours each day being generally sufficient. The rock is soft and the quartz is friable, while, last but not least, the climate is as near perfection as man can desire.

I do not now propose to attempt to describe all the important mines on the Mother Lode, but merely to point out what is being done in Amador County and its immediate vicinity, hoping that others who know the district better than I will supply similar information as to the many important mines on the Mother Lode in the other counties.

The statistics compiled by the California State Mining Bureau show that California produced last year $16,988,044 in gold, and by far the greater part of this was obtained from mines on the Mother Lode. Exactly how much of this was produced by the mines of Amador County I have no means of knowing, but it is probably in the neighborhood of $2,000,000. Amador is one of the smallest counties in the State, and at its greatest width, which is about 18 miles, it is traversed by the Mother Lode. The southern boundary of the county is the historic Mokelumne River, and about a mile south of this, in Calaveras County, is situated the now famous Gwin Mine. One cannot do better than make this the starting point for a tour of inspection through this interesting region.

The Gwin Mine was worked by its original owner to a depth of about 600 feet, and then abandoned. About five years ago a group of enterprising local mining men bought up the property and proceeded to sink a vertical shaft. The vein was cut several hundred feet below the old workings. The vein was found almost exactly where it was expected to be, and with a width of over 20 feet. From that day to this the history of the company has been most successful; 80 stamps are running and 20 more are now being added. The shaft is down 1,750 feet, and the vein continues as good as ever. A new hoisting engine is being erected, and many other surface improvements are being carried out, all of which are being paid for out of revenue, the company paying monthly dividends all the while. During the last 12 months $155,000 has been distributed among the stockholders, making $426,000 that they have received altogether. The returns from the 80-stamp mill, last October, for example, were 12,300 tons crushed, yielding bullion and concentrates to the value of $51,383.

Proceeding north along the Mother Lode from the Gwin there are several smaller mines, on what is known as the east vein; of these the Zeile is the most important; here they are working to a depth of 1,200 feet, and have a 40-stamp mill in operation. The company has its own chlorination plant for the treatment of concentrates.

The town of Jackson is then passed, and for the next six miles there is an almost continuous string of mines. It is estimated that this portion of the Mother Lode has, since its discovery, produced $8,000,000 per mile.

The Argonaut is situated a short distance north of Jackson; the inclined shaft is down 2,000 feet and the 40-stamp mill has yielded good returns. Unfortunately, this mine is engaged in a most expensive lawsuit with its big neighbor, the Kennedy Mine. It is hoped that the decision of this case will clear up some moot points of the law as regards converging and diverging end-lines and their bearing on extralateral mineral rights. It is believed that within a twelvemonth the Kennedy will be the biggest producer in the district. The new vertical shaft is down 2,500 feet, and it is to be continued another 1,000 feet as soon as the new hoisting plant is complete. The cross-cuts at the 2,500-foot level have proved the main vein to be over 70 feet wide, with a small rich vein a few feet to the east of it. The old 40 stamps are kept running from the old inclined shaft, and a new 60-stamp mill is now being erected, to be increased to 80, and possibly 100, stamps if the present favorable developments continue. The new mill is of excellent design, with concrete mortar-blocks, and will be operated entirely by electric power. This company also operates its own chlorination plant.

The Oneida is the next mine to the north. It has imposing looking surface works and a fine mill of 60 stamps. The vertical shaft is down 2,000 feet, and sinking is to be resumed shortly. This is one of the wettest mines on the Mother Lode, and the water is handled by electric pumps.

The South Eureka is working to a depth of 2,200 feet, and has a 20-stamp mill. Immediately to the north is the Central Eureka, one of the most successful of the smaller mines. The workings extend to a depth of 2,000 feet, and are practically dry. The vein has carried shoots of high-grade ore; all the surface works have been erected out of revenue, and all the capital put into the mine has been returned in dividends. The 40-stamp mill and compressor plant are run by electric power. The vein in the bottom of the mine is very strong, and over 16 feet wide. This company has paid $144,000 in dividends since February, 1901.

The old Consolidated Amador has been closed down for some years, but was one of the biggest producers of its day. It is believed that it would have been reopened ere now could the lady, who is owner, have been induced to make reasonable terms. The pretty little town of Sutter Creek lies between this mine and the Wildman & Mahoney, whose 40-stamp mill is situated almost in the main street. Then comes the Lincoln Mine, from the shallow workings of which $2,500,000 is reported to have been taken. A syndicate of local people has, of late years, sunk to a depth of 2,000 feet. This has been done with full confidence that they will find the vein as so many others have done, who have shown practical faith in the recurrence of the ore-shoots on the Mother Lode. The Amador Reduction Works adjoin the Lincoln Mine, and are operated by that popular mining man, ex-Senator Voorheis, who has been intimately associated with the success attending the reopening of the Gwin, the Central Eureka, and the Bunker Hill mines. Following the Mother Lode north, the old 40-stamp mill of the South Spring Hill is idle, but, immediately adjoining it is the Keystone Consolidated, which has been in continuous operation for nearly 50 years, and is reported to have produced $13,500,000. A new stamp mill has been added to the old 40 stamps, and an electric installation has been made which operates both the mill and the compressor plant.

Amador City is the next mining town, and the Bunker Hill Consolidated Mine adjoins it to the north. This company has recently reopened the old mine, and has sunk to the 1,400-foot level. At this level and at the 800-foot they have cut their ore-shoot. A new 20-stamp mill is to be erected in the spring.

Two or three claims further on is the Fremont Consolidated, which has taken over the famous old Gover Mine. This company has sunk 1,500 feet, and has met with the reward that appears to await those who stay with the Mother Lode. A large air-compressor, operated by electric power, has just been installed, and preparations are being made to put up an 80-stamp mill.

Between this mine and the old Plymouth Consolidated is a stretch of nearly two miles, on which little has been done, but which offers many possibilities for legitimate mining. It is rumored that the old Plymouth Mine may be shortly opened again, so that it may add another quota to the $8,000,000 it has already produced.

Enough has been said to convince even the most sceptical that the Mother Lode is by no means exhausted. As a matter of fact in the small district above described there are nearly 200 stamps dropping to-day and pounding out dividends from a grade of ore that could hardly be regarded as "pay" in a less favored region. As yet that curse of so many mining districts, the miner's union, has not got a footing here, and as a consequence the best of relations exist between employers and employed.

The visitor from less favored regions naturally feels more envious than critical, but where so many wise economies are practised, and with such evident results, it struck the writer as an anomaly to find electric power at $6.50 per horse-power per month so lavishly consumed. In the operation of stamp mills, pumps and electrically driven hoists this might be an economy, but to find large air-compressors operated by electric power and the air so generated used for the running of large hoisting plants, seemed to be anything but economical. The explanation is no

doubt to be found in the fact that electric power is new and therefore attractive, especially to those who have been accustomed hitherto to pay a high figure for their water power. Crude oil at $1.50 per barrel, used in conjunction with the best type of boiler and steam engines, would surely be cheaper than compressed air electrically generated for surface engines. In this connection Mr. S. O. Poole, the general manager of the Standard Electric Company, has given some figures which should be comforting to those who utilize electrical energy; he estimates the cost of generating one horse-power, with the different kinds of fuel in the mining districts of California: Wood, $17.78; coal, $15.84; fuel oil, $11.90; though he admits that under favorable conditions it can be managed with fuel oil at $8.93 per month.

AN ENGLISH VIEW OF SOME AMERICAN MINES.*

By J. H. Curle.

The best gold mine in America outside the States, is at present El Oro, in Mexico. Crushing with 100 stamps, the profits for the last two years have averaged about £17,500 a month—or equal to about 20 per cent on the present capital of £1,080,000. Out of this the directors have paid dividends of 15 per cent, and after doing a lot of extra development are carrying forward about £50,000 in cash. The last yearly report of the manager showed ore reserves of 530,000 tons, and a prospective profit on this of nearly £800,000. That represented ore blocked out in the north end of the mine, above the 486-foot level. At that depth the main ore-shoot was 700 feet long, 25 feet wide, and worth $12 a ton. Since then the company has bought its deep-level ground, and from the Somera shaft, situated on that ground, has put in a cross-cut to the reef, and is now driving to get in underneath this main ore-shoot. The depth of this working is 300 feet below the 486-foot level, so that if payable ore, and of the same width, is found here, it will add another 400,000 tons to the ore reserves. As evidence of the chance of getting good ore at this depth it is now stated, I believe, on reliable authority, that in the adjoining mine, the Esperanza, a shaft has lately been put down to nearly this depth, and the reef has been found of payable value.

El Oro is a legitimate mine to invest in. It is not overvalued in the market. It pays 15 per cent on par, and earns 20 per cent. It is going to erect more stamps, and to increase its profits. It has ore blocked out which will yield a profit of considerably more than half its market value, and a great deal more payable ore in sight, of which no account has been taken. Its future in depth, if the Esperanza discovery is as valuable as stated, may soon be shown to be startlingly good, and there are other lodes on the property which may reasonably be expected to turn out well; the management is capable and honest. Taking prospective discoveries into consideration, and the probability of an increase of profits, due to more stamping power, I believe there is no undue mining risk in now buying El Oros to yield 10 per cent interest. The shares, from an investment point of view, may therefore be considered good up to 30 shillings.

The lode worked by El Oro is a strong and regular fissure, and is traceable for several miles. Parallel to it run several other equally strong veins carrying gold, but as yet only slightly explored. For one of these, the Dos Estrellas, I predict a future, and for the whole El Oro field I expect a big future. Next to the big mine lies the Esperanza, a Mexican company. It is working at a greater depth than the El Oro Mine, and the value seems to be holding down all right. North of this again is the mine belonging to the Mexico Venture Syndicate. It is the continuation of the main El Oro lode, with all its characteristics, and I venture to say it is going to turn into a payable property. One of the few other gold mines in Mexico is the Grand Central. I am afraid there is not much hope for this now. The mine proper is worked out. The company is devoting its considerable cash balance to prospecting on the extension, but so far without success. The only payable mine in this district is the Creston & Colorado, which lately passed into the hands of a strong syndicate in the States.

We turn now to Canada. In the whole of this great country there is not one gold mine into which one can buy on an investment basis. There are good coal and copper, and silver and lead, and nickel and iron mines, but, so far, all the promising gold mines have gone wrong in depth. Beginning in the East, there is the small gold industry of Nova Scotia, with its output of about 30,000 ounces a year. Then comes Ontario with one or two small gold and arsenic producers, which are not bad little mines, and Lake of the Woods, with its treacherous lodes going wrong at such shallow depths. In British Columbia the English speculator has lost more severely. It is painful to realize that to-day, so far as is known, mines like Le Roi, Le Roi No. 2, Rossland Great Western, Kootenay and Ymir, are apparently valueless. As regards Ymir, it was a promising mine, but like many such has gone wrong in depth. About the other four it is the tale of two corrupt men, one a promoter, the other a manager—perhaps the less said about them the better. So far as can be seen Le Roi has nothing now but a big tonnage of low-grade ore in the upper levels, which may or may not just pay for working. In depth it is, I believe, almost blank. The No. 2 is as bad. The other mines are worse. Such mines as Center Star, War Eagle and Iron Mask, owned in Canada, carry the continuations of these ore-bodies, but I do not for a moment consider them as real mining investments. Probably the best gold mine in Canada is the Consolidated Cariboo, a hydraulic enterprise, supposed to have 500,000,000 cubic yards of payable gravel to sluice down. But a hydraulic mine is essentially treacherous, and impossible to value; it does not come within the investor's horizon. For this same reason the mines of Atlin and of the Klondike need not be discussed. There are still rich alluvial areas on these northern fields, but they are for the individual worker on the spot, not for the shareholder 8,000 miles away.

A few gold mines are dotted here and there over Central and South America. The richest of these is the Inca Mining Company's property in the Peruvian Andes, owned in America, but the only one which might be counted as a possible investment mine is St. John del Rey in Brazil. It is reported to have a million tons in sight, but at the present price the shares yield a smaller dividend than our requirements allow.

We may now attempt a summary of English owned American gold mines in which it seems reasonably safe to invest, and in which the investor shall receive not less than 10 per cent for his money. The list is a short one, for Americans keep most of their good mines themselves, and, indeed, often work them privately. The investor may buy into Alaska-Treadwell, Camp Bird, El Oro and Tomboy.

Of these, Camp Bird is by far the best at the price. The mine has £1 a share profit in sight, is earning 30 per cent on par, and has immense probabilities. Under Mr. J. H. Hammond, as consulting engineer, and Mr. W. J. Cox, as manager, it is being most capably exploited. One of the directors is Mr. R. J. Frecheville, an experienced mining engineer.

A MINING ENGINEER AND STAFF IN KOREA.

El Oro has assuredly a fine future, and before long some valuable discoveries in depth are quite possible. Here, again, Mr. J. H. Hammond is consulting engineer, and Mr. R. M. Raymond is a most competent manager. On the board are Mr. R. T. Bayliss, and Mr. Hennen Jennings, two mining engineers of great experience. The services of Mr. Philip L. Foster, the late manager, are also available.

Alaska-Treadwell is controlled from San Francisco, and is one of the best handled of American mines. Mr. Joseph MacDonald is manager. A life of many years seems assured.

Tomboy is not yet on an investment basis, but its prospects are so good that it is likely to be so before long. It looks to become a permanent and valuable mine. Under Mr. Bayliss, as managing director, and Mr. Herron, as mine manager, it is handled in quite the best way.

To sum up: Camp Bird shares are worth, as a mining investment, £1 15s.; El Oro, £1 10s.; Alaska-Treadwell (par £5), £4 10s.; Tomboy, £2 per share.

* From a series of articles on "Gold Mining Investments," by the Special Commissioner of the London *Economist*.

TAVENER'S METHOD OF TREATING ZINC SLIMES.

By T. LANE CARTER.

At the last meeting of the Chemical and Metallurgical Society of South Africa, a paper was read which is sure to prove of great value to the metallurgical practice of the Rand. The paper, entitled "The Lead Smelting of Zinc Slimes," was prepared by Mr. P. S. Tavener, cyanide manager of the Bonanza Gold Mining Company, where this process has been carried to its present state of efficiency. By way of introduction a brief description of the present method of obtaining the gold from the cyanide works here, will be appropriate.

In most cyanide plants the boxes are cleaned up three times a month, for it is found that if the solution is allowed to flow through the extractor boxes for two weeks or more, the zinc becomes foul or "dead," and precipitation of gold on the zinc is very poor. On clean-up days, fresh water is first run through the boxes to wash out all cyanide solution, so that the workmen can handle the material with impunity. The compartments are drained, the coarse zinc, after thorough washing, is put to one side, and placed back in the boxes, after the clean-up. All zinc-gold slimes are carried to a vat, where they are treated with sulphuric acid. After treatment this material is sent through a filter-press, where it packs in cakes. These cakes are then taken to the calciner, where they are roasted.

After roasting, this material is ready for smelting, either in ordinary crucible furnaces or in a reverberatory furnace, which will hold 18 to 20 large crucibles. Both systems of furnaces are in use here. In order to get the gold and silver as pure as possible plumbago pots, with clay lining, are used. In the first method a single plumbago pot is put into each furnace, there being from six to eight of these furnaces. When the charge has melted down the slag is ladled out, to make room for more of the fluxed material. Finally the pots are taken out, and the molten mass poured into moulds, the gold going to the bottom of the mould. When a mine has a reverberatory furnace all the pots are charged with the fluxed material, and put into the furnace. After the mass has melted the pots are withdrawn one by one, and poured into moulds.

Many disparaging comments have been made on this method of dealing with the material from the cyanide works. In the first place, it is expensive, large quantities of chemicals being required to flux the slimes. Secondly, there is the presence of a good deal of lead. It is the practice at Johannesburg to use large quantities of acetate of lead in the precipitation boxes, and as the subsequent acid treatment and calcining get rid of only a small per cent of this lead, the remainder is found in the product to be smelted. To keep the bullion free from lead, manganese dioxide, or niter with sufficient silicate of soda or sand, is added. This, of course, necessitates the use of a clay lining, which is expensive. In getting rid of the lead in this way, some of the silver is also carried into the slag, and becomes lost, as far as the companies are concerned. Again, this method of dealing with the product from the cyanide works is objectionable, on account of the large amounts of by-products, rich in gold, which are produced. These by-products are sold to reduction works, at a price considerably below the real value of the gold contents, so that there is an indirect loss, which is by no means negligible.

The opinion of experienced chemists has always been that there is more loss of gold by this method of smelting than any one realized. The paper read by Mr. Tavener seems to confirm this view.

It is a characteristic of mining practice here to act quickly, for already many of the leading mines are making arrangements for installing this new method of smelting, without loss of time, and doubtless within a year it will be practically universal. Shortly before the war many of the companies erected expensive reverberatory furnaces, but these are being pulled down now, and the bricks are now used in the building of the furnaces required for the new method. It is probably more correct to say that the principle of this method is old, although the application is new. In the Siemens-Halske process gold is precipitated on lead foil. The lead is run down in a furnace, and turned out in pigs. These pigs are then cupelled, the gold and silver being left on the bone ash.

It is simply the application of this idea to zinc-gold slimes that Mr. Tavener described in his paper. Instead of treating the slimes with acid, he takes them direct from the filter-press to the lead furnace. The slimes are mixed with litharge and a flux of assay-slag and put into a furnace of the same type as is used in the Siemens and Halske process. A slow fire is made, to drive out all moisture, and then it is made more intense, until the mass is in a molten state. Sawdust from the carpenter shop is used as a reducing agent. The molten mass is continually mixed, to prevent the formation of lumps, etc., and when the slag shows the proper consistency, i. e., a glassy viscous black, it is drawn off at the slag door. The lead is run into moulds from another opening. The bullion from the lead furnace is purposely kept low, 7 to 8 per cent being considered a good grade of bullion.

The lead pigs are now taken to a cupellation furnace. Across the surface of molten lead an air blast is played, the litharge being driven across the test in quiet riffles, to a hole in the bone ash, where the molten litharge runs out, into a special pot. The gold and silver from the cupel is run down in a plumbago crucible, and cast into bricks.

For this new method of dealing with the product from the cyanide works, several advantages can be claimed.

(1) It is more rapid than the old method of smelting.

(2) It is much cheaper. There is really no comparison as far as costs are concerned. In the acid method, as much is spent in sulphuric acid alone as the total cost of smelting by the lead method. It is assumed that in both cases the plant has been installed. To construct the two furnaces for the lead method would cost no more than a large reverberatory furnace for the old method of smelting.

(3) There will be no by-products for disposal. As has been mentioned already, whenever a gold mine is forced to sell by-products to reduction works, there is a loss in the transaction. In the lead method it is possible to treat everything that carries gold. Floor sweepings, old pots, zinc leavings, ashes, in fact, anything and everything carrying gold, can be thrown into the lead bath, and the gold will be found in the lead. Then, too, there is no danger of leaving any silver, for it will all be obtained in the bone ash test which forms the bed of the cupellation furnace.

(4) There is less liability to loss in handling. It need hardly be pointed out that such valuable material as gold-zinc slimes should be handled as little as possible. In the present method there is too much handling, in washing the zinc, carrying from the calciner to the furnace, mixing with shovels in boxes, etc. By the lead method this handling is reduced to a minimum.

(5) More gold is actually obtained. This might sound like the claim of an alchemist, but in every competitive test we have had, the lead method of smelting has shown higher results. On a number of occasions, the auriferous material was carefully divided into halves, one-half being treated by the ordinary method, and the other half by the lead method, and every time the lead method has come out ahead. It might be claimed that the zinc gold slimes treated by the lead method, contained more of the precious metal than the other half treated by the ordinary smelting method, but the law of probabilities would surely go to the other side, sometimes. In some cases as much as 4 per cent more gold has been recovered by the lead method than was obtained by the other method, so that Mr. Tavener's claim that one per cent more gold will be recovered by the lead method, is a conservative one. It is my opinion that these tests have proved that we never sufficiently realized how much gold is lost in the ordinary smelting of zinc-gold slimes.

This is a very brief outline of an interesting event in local metallurgical practice, but the next number of the *Journal* of the Chemical and Metallurgical Society of South Africa will contain a complete account of the process, with drawings of the furnaces.

METALLURGICAL METHODS AT KALGOORLIE, W. A.

By E. BARTON HACK.

The many different methods of extracting gold from the refractory ores of the Kalgoorlie District in West Australia, present some features of interest to metallurgists.

About twelve months prior to the commencement of energetic work at Kalgoorlie, the neighboring gold-field of Coolgardie had initiated the first of the processes of ore-reduction. At the Bailey's Consols Mine, in the latter district, the first mill was erected, a stamp battery of 20 heads with amalgamating tables, and for some time the whole extraction, from 65 to 70 per cent, was done by amalgamation alone. Afterwards two Wilfley concentrating tables were added, and the concentrates transported to Perth, on the coast, 340 miles distant, for shipment to the smelters at Adelaide. In this way an extraction of 80 per cent was obtained.

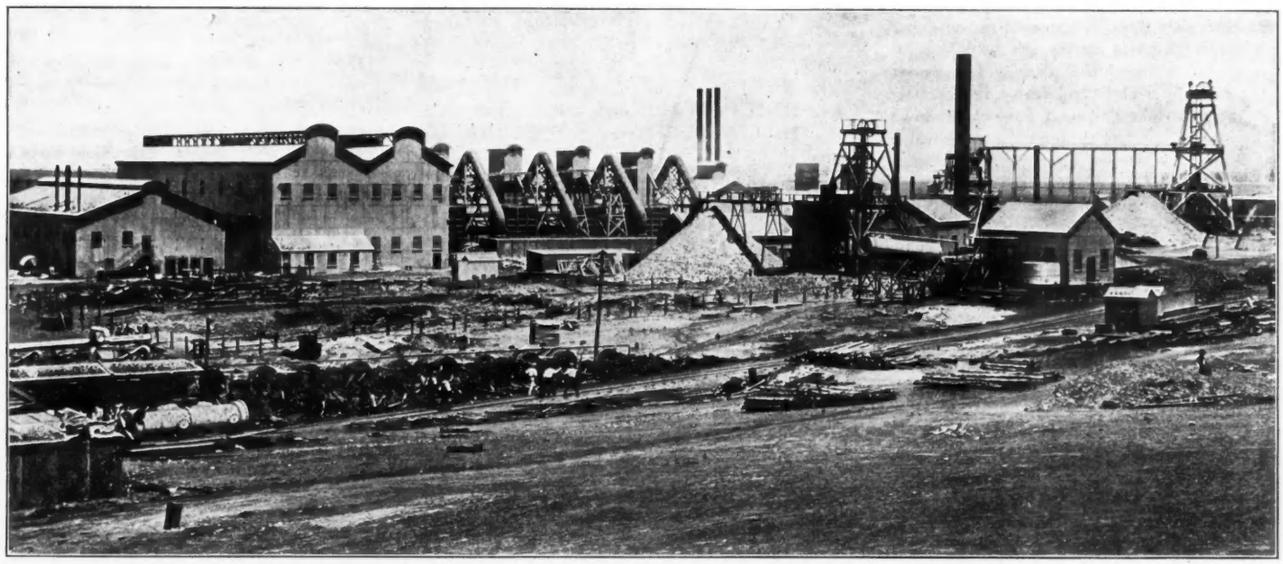
Cyanide was then introduced to treat the tailings by direct leaching (single process) and finally the extraction was raised to 92 per cent. The upper levels of the first discovered mines in most cases gave fair values, but when the sulphide zone was reached, at an average depth of from 80 to 120 feet, there came trouble. The amalgamating tables gave a poor extraction, and the increasing diminution in values, as a greater depth was reached, together with the enormous cost of mining and labor, and want of water, caused the lower grade mines to close down, and now Coolgardie, which in 1897 was the proud capital of the gold-fields, takes second place to Kalgoorlie.

The small Australian company which first owned the Great Boulder Proprietary Mine, at Kalgoorlie, commenced operations in that district and erected a 10-stamp battery, but one day they discovered that the small quartz leader, which they had been following, was merely a center vein of a large schistose lode, about 30 feet wide, with clearly defined hanging and foot-walls. The lode was of far greater value than the small leader in the center. This discovery caused an absolute revolution in the mining of the district, and instead of following the quartz leaders, cross-cuts were driven into the supposed country rock, with the result that a series of eight parallel lode-formations were discovered, beginning at a point half a mile north of the original Hannan's Reward claim, and extending nearly 1½ miles southward. This tract is now known as the "Golden Mile."

The oxidized ores offered very little difficulty in treatment, but the refractory ore of the sulphide zone which contained a large percentage of gypsum, magnesite and calcite, was a far different matter. Several methods of treatment were tried. At the Great Boulder Proprietary, the old stamp-battery was found to be inadequate, and after treating the sulphide ores for about twelve months the value of the tailings rose to such a degree that it was decided to introduce some other process.

Mr. William Konemann, who came from Colorado, was engaged to erect a mill for treating the talcose sulphide ores with a patent process of his own; and under arrangements with the London directors, he went to Kalgoorlie and expended $120,000 in erect-

ing a plant, which on trial proved a disastrous failure. He introduced a system of air agitation into his cyanide vats, which I believe is known as the pneumatic, or Webb, process. It was found to be an unpractical method of agitation, as in most talcose slimy ores the effect of air jets conveyed through pipes at the bottom of the vat was to give local agitation only, besides being far from economical, owing to the great volume of compressed air required to sufficiently agitate a large vat. After Konemann's experiments, the Lake View Consols Company introduced a large system of cyanide leaching vats to treat their tailings, resulting from stamp-battery and amalgamation treatment. Owing to the cement-like properties of the ore after crushing, the pulp caked in the vats. Mechanical agitators were then introduced, and proved more successful, as they kept the pulp in motion and prevented caking; but even with a ten-day treatment by leaching, both single and double process, a good extraction could not be obtained, as owing to the talcose nature of the ore a thorough permeation of cyanide solution was not practicable. Mr. Sutherland, metallurgist to the Lake View Consols, introduced the filter-press, using



THE BOULDER PERSEVERANCE MILL, KALGOORLIE, W. A.

first of all a simple press, originally intended for the extraction of fluids from sewage. The intention originally was to use these presses to extract the water from tailings and slimes, water being one of the most expensive and valuable items on the West Australian gold-fields. One day an experiment was made of forcing cyanide solution, about .05 strength, through the press, and it was found that a good extraction was made. Owing to this discovery, extensive tests were made with different kinds of presses on the cyanidation of slimes; and ultimately, it was discovered that a very much quicker and economical extraction could be made of the slimes in this manner than by any other method. The first plant erected to utilize this process was on the Golden Horseshoe Mine, but it was not until 1889 that the Great Boulder Perseverance Mine erected a plant of any magnitude. The Perseverance is a lease of 24 acres, lying between the Great Boulder Proprietary, the Associated and Lake View Consols gold mines, and is under the management of Mr. Ralph Nichols. He, with his assistant, Mr. F. S. Blakeslee, erected one of the largest and finest mills in Australia. The general process that they adopted was as follows: The ore passes through Gates breakers and is delivered by belt-conveyors from the main ore-bins to Griffin mills, where it is crushed to 60-mesh. The pulp is thence conveyed to Holthoff-Wethey roasters, where it undergoes treatment for 8 hours, the dust from the roasters being taken through up-casts into a long dust-settling chamber. After roasting, the pulp is cooled on a long hearth, elevated to a Spitz mixer, and then distributed over a series of amalgamating pans, 8 feet in diameter. Here an extraction of from 18 to 30 per cent is made. The pulp is again slimed to 150-mesh in the pans, and thence passed on to a series of agitating vats, 24 in number, 20 feet in diameter and 4½ feet deep. Here a weak cyanide solution is added. After two to three hours' agitation in the weak solution, the pulp is passed into montejus, or pressure tanks, and thence forced with compressed air, at about 80 pounds to the square inch, into the filter-presses. Each press contains when filled about six tons. The pulp when entering the press carries about 55 per cent liquid to 45 per cent solids. After the presses are filled, compressed air is forced through the cakes for about 10 minutes, and then cyanide solution of .08 strength is forced through at about 90 pounds pressure for about 25 minutes, and the cakes again dried with compressed air. Clear water is then forced through the press until the whole of the cyanide is extracted, the cakes again dried, the press taken apart, and the contents dropped out and conveyed away to the residue dump. In some cases this process is slightly altered, solution and air being alternated in five to ten minute intervals. The solutions, after leaving the press, are taken direct to zinc precipitation vats of a similar type to those used elsewhere, the zinc slimes being afterwards treated, washed and freed from the sulphates in small filter-presses and the gold smelted and refined in the mill. The Perseverance mill now treats 360 tons per day, and is making an average extraction of 94 per cent, the average for last year up to June being about 15,700 ounces refined gold per month, of a value of about $19.75 per ounce, the cost of mining being about $1.80, and milling $5.10, the latter being a little heavy owing to the high cost of labor, water, fuel and stores.

Another method is to use a double process of filtration, the pulp being first agitated in a weak solution for a short period, and then taken through montejus into filter-presses, dried with air, then weak solutions forced through and again dried. The press is then opened, and the cakes are dropped into vats where the pulp undergoes a thorough agitation in strong solution, and is then passed through a second series of filter-presses, where the final extraction is made. The objection to this process is the heavy cost of labor in handling the ore, and it is doubtful if a better extraction can be obtained than with the single process, and, as a matter of fact, the advocates of the double treatment have but recently abandoned it in favor of the new and universally adopted method of single treatment.

On the Kalgurli Mine a new mill has recently been erected, where a somewhat different process is adopted. This mine is the proud possessor of the only hill in the district, this hill being of the dizzy altitude of about 60 feet from the surrounding plain. Advantage is taken of this hill to obtain grade. The ore is crushed with a Comet breaker, and then taken by a Bleichert tramway to the top of the hill, dried by rotary dryers, and crushed to 60-mesh with No. 7 Krupp ball-mills, roasted for 8 hours in a series of ten (8 feet by 65 feet) Edwards roasters. This roaster is an Australian patent, made at Bendigo, Victoria. The pulp is then elevated to a mixer and passed through a series of hydraulic classifiers or spitzluten, the sands or coarse slimes being then separated from the fines. The sands are passed over copper amalgamating plates where an 18 to 25 per cent extraction is made, thence over percussion concentrating tables of the Halley type, whence the gangue is conveyed to leaching cyanide vats. The concentrates from the tables are again roasted in an Edwards roaster, passed through 5-foot amalgamating pans and slimed, and thence to agitating tanks. The fine slimes from the hydraulic separators are conveyed to slime separators, or spitzkasten, the clear water being taken off and returned to the head-water tank; the thickened slimes are taken off from the bottom into mechanical agitating vats, where cyanide solution (0.05) is added. After two or three hours' agitation the pulp is forced into montejus, and thence into filter-presses similar to those at the Great Boulder Perseverance. The solutions, after being forced through the cakes in the presses, are taken through another clarifying press, and thence to zinc boxes.

The class of ore treated in the Kalgurli Mill is of lower grade than that at the Great Boulder Perseverance, the former averaging about $55 to $60 per ton, and the latter from $70 to $85. The Kalgurli ore also contains less tellurides, and is therefore of a less refractory nature.

The Lake View Consols, Golden Horseshoe, Ivanhoe, Hainault and Golden Link Consolidated mines crush the ore with stamp-batteries, 1,250-pound stamps, 7-inch drop, 90 to the minute; the ore passes over amalgamating plates, Wilfley and Wesley-Baird concentrating tables. The gangue is reground in grit mills and passed through agitating vats and thence through montejus to filter-presses, the concentrates being roasted and then amalgamated in pans, and slimed, and passed through agitating vats to filter-presses.

The Lake View Consols has also another plant, using the Diehl process, first introduced at the Hannan's Brown Hill Mine. This process is a patent

one, introduced by Dr. Diehl, of the London & Hamburg Gold Extraction Company.

The ore is crushed by stamp-batteries, amalgamated and concentrated, the concentrates roasted and amalgamated, the gangue classified and treated with bromo-cyanide in large leaching and agitating vats.

This company claims to obtain a good and economical extraction, but the figures that I have seen appear to me rather unreliable, as some costs which should be chargeable to milling do not appear on cost sheets; and I have heard that there is a loss of fine particles of telluride dust during the process. However, this process is comparatively new, and has yet to prove itself. In any case, the mixture of the two chemicals means a large expenditure for ice, as bromo-cyanide cannot be mixed at a higher temperature than 80° F., and when we consider that for several months in the year the temperature at Kalgoorlie approximates 102°, it will be readily seen that this must add 10 to the cost of extraction.

The type of filter-press now universally adopted is made by Dehne, of Germany. The cakes are 40 inches square, 3 inches thick, the filter frames being 1⅛ inches thick, covered with perforated plates, over which a heavy all-wool filter cloth is passed. The press is tightened up mechanically, and the pulp forced into the cakes through channels in the upper corner. Separate channels convey the cyanide solutions, and are so arranged that the solution passes through the cake, filter-cloth and frame immediately next to it, the next cake and next filter-cloth, down through the filter frame and through the outlet valve at the bottom of the second filter frame. Thus a thorough permeation of the whole of the cake is made with the cyanide solution, it being forced through with a pressure of about 70 to 100 pounds to the square inch.

A small experimental plant for the treatment of slimes by cyanidation in filter-presses has been erected at the Camp Bird Mine, at Ouray, Colorado, and tests on the ores there have shown the practicability and economy of the process, although the type of press used was not one to give thorough efficiency or extraction.

Owing to the scarcity of water, large sums of money have been expended in the endeavor to successfully treat the West Australian ores by dry methods. On the Hannan's Brown Hill Mine a large dry-crushing reduction plant has been erected. Blake crushers and Krupp ball-mills reduce the ore to 60-mesh; 90 per cent of it will pass through a 150-mesh. The pulverized ore then passes through revolving trommels and is classified, the coarser product being again pulverized in Krupp grit mills. The dust is then passed through a "dry blowing" machine where the lighter particles are blown out, and the residues, consisting of the heavier concentrates and free gold, are drawn off and sent by rail to the smelter. The percentage of extraction has proved low, and although a somewhat economical method of treatment for oxidized ores, it has been shown to be practically useless for the more refractory sulphides.

The problem of the treatment of talcose slimes is one which has engaged the attention of metallurgists throughout Colorado and other mining districts in America, and the filter-press process herein explained is one which the writer thinks well worthy of consideration.

PRESERVATION OF WOOD.—According to A. Flamache, in French patent 319,354, March 6, 1902, soluble salts of barium act as preservatives for wood.

WHITE LEAD VS. ZINC WHITE.—A commission appointed by the Societe de Medecine Publique et de Genie Sanitaire in conjunction with the Chambre Syndicale des Entrepreneurs de Peinture de la Ville de Paris is making a series of comparative tests in painting different kinds of surfaces at the Pasteur Institute in Paris. The conclusions so far arrived at are that zinc white, with manganese resinate as a drier, works, covers and dries equally well with white lead.

ANNUAL MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA AND THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SECTION E.

BY E. O. HOVEY.

The annual meeting of the Geological Society of America was held December 30th to January 2d, at Washington, D. C., in conjunction with the convention of the American Association for the Advancement of Science and many other scientific societies. The combination of Section E (geology and geography) of the Association with the Geological Society drew an unusually large number of geologists to Washington, and the meeting of the society was the largest held in its history of fifteen years. Section E held two independent sessions, one Monday afternoon, December 29th, and the other Friday morning. The latter was devoted to the recent eruptions in the Windward Islands and the geology of the group and the time was occupied for the most part by the papers presented by some of the geologists (Messrs. Hill, Russell, Heilprin, Curtis and Hovey) who went to the scene of activity last summer directly after the eruptions began. The remaining sessions of the meeting were in the hands of the Geological Society, the papers of Section E being merged in the programme of the society.

The president of the Geological Society was Prof. N. H. Winchell, and the secretary was Prof. H. L. Fairchild; the vice-president and chairman of Section E was Prof. William Morris Davis, and the secretary Edmund Otis Hovey. For the ensuing year the officers elected at Washington are: President of the Geological Society, S. F. Emmons; secretary, Prof. H. L. Fairchild; vice-president and chairman of Section E, Prof. Israel C. Russell; secretary, Dr. George B. Shattuck.

The address of the retiring president, Prof. N. H. Winchell, discussed the question, "Was Man in America in the Glacial Period?" It was delivered December 30th, in the banquet room of the New Willard Hotel, and was followed by a "smoker" given the national society and visiting geologists by the Geological Society of Washington. The annual dinner of the society was held at the Raleigh Hotel, December 31st, and was a most successful affair in every way. The programme of papers presented by both bodies of geologists was very long and was of high degree of excellence. Forty-eight papers, aside from the presidential address, were on the Washington programme of the Geological Society, and forty-six upon that of Section E. Not many of these were upon questions of direct economic geology, and abstracts of only those papers will be presented here which seem to be of especial interest to men who have to deal with such problems.

"The Economic Geology of Michigan," by Alfred C. Lane, State Geologist of Michigan. The author defined economic geology as the "science of raw materials." The effect of the presence of these materials upon industry, and the effect of geological conditions upon their development, were illustrated by reference to several Michigan products. Such factors were considered as the position of the State in the center of the Great Lake distributing system, the tilting of the Great Lake basin and its effects, the mutual relations of coal and iron and the development of the iron-ore business, the peculiarities of lake copper as compared with that of the far West. Salt, limestone and lumber and their mutual relations, and the coal basin and the causes of its retarded development were discussed.

"Some results of the Late Minnesota Geological Survey," by N. H. Winchell, Minneapolis, Minn. This paper mentioned some of the scientific conclusions and some of the known economic results of the Survey presented in the final report. Among the scientific conclusions have been: the identification of the parts of the Upper Cambrian; the definition of the Lower Silurian; the determination of the extent of the Cretaceous toward the east; the definite determination of the duality of the ice epochs; the determination of the duality and alternation of the ice lobes and the resultant glacial lakes; the discovery of the duality and later of the triple character of the iron horizons of the Lake Superior region; the separation of the Archæan into two non-conformable parts; the discovery that the Animikie formation overlies both parts of the Archæan non-conformably; the recognition of the igneous origin of the green-sand of the Animikie; the determination of the igneous origin of the jaspilytes of the Mesabi and Vermilion ranges; the addition of numerous minerals to the geographic area of the State; the determination of the metamorphic origin of gabbro from Archæan green-stone and of granite from Archæan sediments. Among the economic and educational results have been: the determination of the cause of foul waters in the prairie region; the demonstration of the excellence of the Hinckley sandstone and its consequent wide adoption; the discovery and announcement of the Mesabi iron ores; the distinction of the gabbro (igneous) ores from the Mesabi iron range; the delineation of the Mesabi belt as distinct from the Vermilion, which has facilitated search and exploitation; the demonstration of the utility of entrusting geological surveys to the State universities.

"The Topographic Work of the Geological Survey in Northern Canada," by Robert Bell, M. D., Acting Director Geological Survey Department, Ottawa. Previous to the confederation of the Canadian provinces in 1867, and the subsequent acquisition by the Dominion of the other British possessions in North America, including British Columbia, the territories of the Hudson's Bay Company, the Labrador Peninsula, and all the islands lying north of the mainland of North America, the operations of the Canadian Geological Survey were confined to the southern parts of the areas which now constitute the provinces of Ontario and Quebec. Since confederation, however, the attention of the department has been directed to surveying these vast newly acquired territories and the regions which have been added to Ontario and Quebec. These tracts were entirely unsurveyed and only partially explored, the main geographical features alone being roughly indicated on the maps. The subdividing of the fertile lands of Manitoba and the Northwest Territories was performed by a different department, and their work added little to the knowledge of the topography of the country. The fieldmen of the Geological Survey have been the pioneer surveyors of the natural features of the vast regions which constitute half the continent. In order to map out the rock formations, the geologists found it necessary to make topographical and geological surveys simultaneously. From their long experience in these operations, they have been able to do this work rapidly and well, and the object of this paper was to show the astonishing amount of accurate geographical work which has been accomplished by a small number of devoted men with very limited means at their disposal.

"Quantitative Chemical Mineralogical Classification of Igneous Rocks," by Whitman Cross, J. P. Iddings, L. V. Pirsson and H. S. Washington. The presentation of the subject embraced a statement of the needs and the occasion for such a classification of igneous rocks; the principles on which it is based; the method of procedure employed to produce quantitative subdivisions of rock magmas; the method of expressing the actual mineral development (composition) and texture of the rocks; the nomen-

clature proposed; the proposition to establish a classification and nomenclature for use in field work, and for general geological purposes. The presentation closed with a correlation of the quantitative classification with the one in use at present.

"Chemical Composition of Igneous Rocks Expressed by Means of Diagrams," by Joseph P. Iddings, Chicago University. The diagrams shown and described express the molecular proportions of the chief chemical components of igneous rocks; the range of their variation; the gradations of igneous rocks chemically between extremes; the grouping of them according to the system of quantitative chemico-mineralogical classification, recently proposed by Cross, Iddings, Pirsson and Washington. The paper closed with a correlation of igneous rocks classified on the quantitative basis with the same rocks classified on the qualitative or "old" basis. The correlation of the two systems will be presented by Washington and Iddings.

"The Quantitative Distribution of Rock Magmas," by Henry S. Washington, Locust, N. J. The relative abundance of rock magmas belonging to the various divisions of the quantitative, chemico-mineralogical system of classification recently proposed, was discussed, with remarks on the special distribution of some of them. The advantages of the new system for the treatment of such problems was pointed out, and it was compared as to certain respects with the old. A large collection of analyses of igneous rocks, on which the discussion is based, was briefly described.

"On the Porphyritic Appearance," by Alfred C. Lane. There are some five different kinds of phenocrysts, or crystals, which may give a porphyritic appearance, to wit: Coarser relics of a previous consolidation. Crystals whose formation took place during the migration of the igneous magma. Crystals which were formed early in the process of cooling and solidification so that their grain continues to increase clear to the center, while later formed constituents increase only for a shorter distance from, their grain thereafter remain uniform. This porphyritic type will be most obvious at the center of the igneous mass. Crystals, the conditions (temperature) of whose formation were nearly half way between those obtaining initially in the igneous magma and the country rock. Such crystals will be most conspicuously porphyritic at or near the margin. Finally, there may be crystals, which, like the staurolite of schists, are formed by metamorphic actions, of secondary origin, and occur in sediments, and only casually occur in igneous rocks. Attention is particularly called to the third and fourth classes, the possibility of the existence of which has been almost overlooked, though their possible existence may be readily inferred from inspection of diagrams of the cooling of an intrusive. Certain field observations render their actual existence probable.

"Dikes in the Oklahoma Panhandle," by C. A. Waldo. In this paper the author referred to the discovery of mineral dikes in the extreme northwest townships of Oklahoma Territory. This section has not been carefully mapped by the Geological Survey, and it is a region about which little has been written. The discovery of the dikes resulted from an attempt to explain the existence of extensive mineral deposits in that locality, the origin of which had not previously been understood.

Block Mountains of the Basin Range Province," by W. M. Davis, Harvard University. Observations of several of the Basin Ranges in the summer of 1902 support the opinion of Gilbert, Russell and others that the ranges observed are carved in uplifted or tilted blocks of earth-crust that had been previously much deformed and eroded. The faulting of the crustal blocks has been continued into recent geological time. The amount of erosion during the progress of faulting has been so great that the pre-fault topography cannot be safely determined.

"Basin-Range Structure in the Death Valley Region of Southeastern California," by M. R. Campbell, United States Geological Survey. Recently attention has been called to the geologic structure of the mountain ranges of Nevada and southeastern California. An attempt has been made to show that they are generally anticlinal in structure, and that the tilted-block type which Gilbert has described, and which is generally known as basin-range structure, is of rare occurrence. The object of the present paper is to show that, although minor folding was observed in the Death Valley region, the mountains are generally composed of huge blocks of strata that have been strongly tilted and then eroded into their present forms. The region described is traversed by two systems of structures; one extending in a north-south direction, being the southern extension of the true basin ranges of Nevada, and the other crossing these in a northwest-southeast direction parallel with and presumably an off-shoot from the main line of the Sierra Nevada. The movements which produced these structures seem to have been preceded by an epoch of slight folding in which the Paleozoic strata were somewhat deformed. This was followed presumably in Eocene time by faulting and tilting along northwest-southeast axes which formed parallel mountains and valleys trending in the same direction as the Sierra Nevada. In the valleys so formed lakes accumulated, probably through a change in climatic conditions, and sediments having a thickness of several thousand feet were laid down. In these lake beds are the great deposits of salt, gypsum, soda and borax, which have made the region famous. Following this period of sedimentation came one of movement along north-south axes, which lifted and tilted the surface into immense mountain ranges trending parallel with the new axes. Panamint, Death and Amargosa valleys were thus formed, and Funeral and Panamint mountains were raised up between them. Lakes formed in the new valleys and received sediments similar to those of the preceding period.

The age of the second lake-forming period is vaguely referred to late Tertiary. From structural and stratigraphic evidence the beds are younger than the lake sediments of Death Valley, and they are certainly older than the gravel deposits which mark the Pleistocene period in this region; therefore, they are provisionally classed as Miocene and younger.

"The Hanging Valleys of Georgetown, Colo.," by W. O. Crosby, Massachusetts Institute of Technology. The paper described chiefly the break of several hundred feet between the floor of the valley of Clear Creek and that of Leavenworth Creek, one of its principal tributaries, and explained it as due, not to fluvial or glacial erosion, but to faulting, of which abundant independent evidence is afforded by mining developments. Other and similar features in the vicinity were correlated with this, and it was shown that the part of the main valley occupied by Georgetown is a depressed fault-block or "graben," and that the valley is, therefore, due in part to displacement and not wholly to erosion, suggesting comparison with Yosemite Valley. The idea was advanced also that the elevation of this, the oldest of the Colorado ranges, has been recently, and may be still, in progress, and that while in the past the movement has been chiefly massive, developing the great fault-scarp overlooking the plains, it has in later times affected the axis more than the axis of the orographic block, leading to a marked tilting of the cretaceous peneplain; and in part, at least, it is very locally differential, and in the Georgetown instance in a degree to accelerate the topography.

"Concretions and their Geological Effects," by J. E. Todd, State Geologist of South Dakota. Concretions were defined and distinguished from secretions, stalactites, geodes, etc. Their structures are nucleated, solid, rythmical and cracked within. Their shapes are globular, lenticular, elongated, lobular and irregular. Their composition was discussed and their methods of growth, accretions, intercretions and excretions As to distribution, they follow strata, the surface of ground water, nuclei, or are uniformly distributed. Their geological effects are, consolidation of strata, formation of cone-in-cone, of flint ridges, of mesas and buttes, the deposition of iron ores, etc.

"Timber Lines," by Israel C. Russell, University of Michigan. "Timber-line," as commonly defined, is the upper limit of arboreal vegetation on mountains. Its position is determined mainly by the occurrence of a mean annual temperature of about 32 degrees Fahrenheit, but locally its elevation is regulated by soil conditions, and by differences between various localities in snowfall, severity of winter storms, exposure to the sun, etc. It may with propriety be termed the "cold timber-line." Above it on high mountains, there is commonly a region occupied by alpine flowers, and still higher a region of perpetual snow. When traced from warm to colder regions, or in general from equatorial toward polar regions, it becomes lower and lower; in North America it descends nearly to sea level in Alaska and northern Canada, where it defines the northern limit of the sub-arctic forest and becomes the "continental timber-line" to the north of which lie the barren grounds and tundras, which correspond to the zone of alpine flowers on lofty mountains in temperate latitudes.

On some of the mountain ranges of the arid portion of the United States, there is a lower limit of tree growth, the position of which is determined, in the main, by insufficient moisture, and locally by soil conditions, including the presence of alkali, hot winds, forest fires, exposure to the sun, etc. This may be termed the "dry timber-line." Below it are treeless, grass-covered plains and valleys. On the mountains of central Idaho, the cold timber-line is sharply drawn at an elevation of about 10,000 feet, while the dry timber-line, equally well defined, has an elevation of about 7,000 feet; between the two there is a belt of forest trees which encircles the mountains. In Southeastern Oregon, Nevada, Southern California, etc., where the climate is excessively arid, the dry timber-line is higher than in Idaho, and in certain localities meets the cold timber-line and the mountains are bare of trees from base to summit. The dry timber-line decreases in elevation when traced from arid to humid regions. In the central part of the continental basin of North America, it defines the border of the treeless portion of the Great Plateaus and the prairie plains, and at the north coincides with the southern limit of the subarctic forest. On the borders of the treeless plateaus and the prairie plains the position of the margin of the encircling forest is determined mainly by lack of moisture, but is varied locally by soil conditions, hot winds, forest fires, etc., in the same manner that the lower limit of tree growth on the mountains of arid region is regulated.

When the humidity is sufficient for the growth of trees, as for example on the mountains of New England, the dry timber-line disappears. An arid region may be bordered at a lower elevation, by a region with sufficient humidity to permit trees to grow, and may then be bordered both above and below by the dry timber-line, as is the case in Southern Idaho. Where an arid region reaches sea level as in Arizona, Southern California and the west coast of Mexico, etc., there is no forest below the arid belt, and in certain localities the dry timber-line meets the cold timber-line, and the mountains are bare of trees from sea level to their summits.

There is also a third general cause which draws a limit to timber growth, namely, excessive humidity, as for example on the borders of swamps, the margins of lakes, etc., which may perhaps be termed the "wet timber-line."

"The Basal Conglomerate in Lehigh and Northampton Counties, Pennsylvania," by Frederick B. Peck, Lafayette College. The basal conglomerate occurs here as elsewhere, fringing the Pre-cambrian areas. In eastern Northampton County it fails occasionally, (1) as a result of faulting or (2) because it was never deposited. It has a thickness varying from zero at Easton, to one hundred or possibly several hundred feet at Alburtis, twenty-four miles southwest of Easton. Petrographically, it is quite variable. At times it is a coarse conglomerate, made up of quartz pebbles, an inch or two in diameter. Frequently it is a medium to fine-grained arkose, consisting of about one part feldspar (orthoclase and microcline) to two or three parts quartz, the former usually thoroughly kaolinized, the latter badly crushed, and under the microscope exhibiting an undulating extinction, and occasionally a distinctly biaxial character. Other phases of it present a dense bluish or grayish quartzite. It occasionally contains interstratified beds of a very fine-grained, argillaceous sandstone containing numerous worm borings (Scolithus), but as yet no distinctively lower Cambrian fossils have been found. The seemingly uppermost member is a highly ferruginous, almost jaspery quartzite, which locally contains iron enough to constitute a low grade ore. From this horizon a considerable amount of iron ore was formerly derived.

"A New Meteorite ('Bath Furnace') from Kentucky," by A. M. Miller, Kentucky State College. The meteorite, which was exhibited, is the one which occasioned the brilliant display seen at 6.45 on the evening of November 15th by many persons in the States of Ohio, Kentucky, Tennessee, Louisiana, Mississippi, Alabama, and Georgia. Its detonations, associated with the checking of its orbital velocity by the resistance of the air, startled the inhabitants of Bath County, Kentucky. It actually struck the earth in the road in front of the house of Mr. Bluford Staten. The latter, an eye-witness of the event, picked the stone up on the following morning. It is an ærolite containing, among other substances, disseminated nickeliferous iron, and it exhibits the usual black crust with pittings. Before chips were removed for analysis, it weighed very close to thirteen pounds. Specific gravity, 3.48. It passed into the hands of Mr. W. H. Daugherty, of Owingsville, Ky., from whom it was purchased by Prof. Henry A. Ward for the Ward-Coonley Collection, American Museum of Natural History, New York City.

"Science at the World's Fair, St. Louis, 1904," by J. A. Holmes, St. Louis, Mo. The exhibits at the approaching Universal Exposition to be held in St. Louis, from April 30 to December 1, 1904, will endeavor to show the applications of science in all the great industries of the country; and in some of these departments, notably that of mines and metallurgy, it is proposed to show the equipment and methods of geological surveys and similar institutions for geologic, geographic, and metallurgic research; in fisheries will be shown methods and equipment for biologic research; in literal arts, laboratory research equipment in many branches of science; in education, equipment and methods of instruction and research at the institutions of learning; in the department of electricity will be shown modern equipment and methods of electrical research. In addition arrangements are being made for holding, under the auspices of the Exposition, a number of scientific congresses for the discussion of methods and equipment, and general plans for research, in all departments of knowledge.

At the fourth annual meeting of the Cordilleran Section of the Geological Society of America, which was held in San Francisco, December 30th and 31st, an interesting programme was presented from which we cull the following as being of especial value to the readers of the JOURNAL.

"The Synthesis of Chalcocite and Its Genesis at Butte," by Horace V. Winchell, Butte, Montana. Perhaps the most important of all copper ores, commercially, is chalcocite. Certainly the bulk of the copper produced from the largest copper-mining camp on the globe comes from this mineral. The author describes briefly the conditions under which it occurs at Butte; and the method by which he has been able to produce it synthetically in the wet way, following closely the conditions under which it has been formed in the Butte mines.

"A Geological Reconnaissance of the Region of the Upper Main Walker River, Nevada," by D. T. Smith, Yerington, Nev. This region is in the western part of the State of Nevada between latitudes 38° 50′ and 39° 10′. It comprises the greater portion of a valley of a general north-south trend. Nearly ten miles of the eastern range and sixteen of the western has been mapped geologically. The eastern range is made up of granite, andesite and rhyolite. The western range is also made up of these, together with schists, garnetiferous rocks, and metamorphic limestones. These metamorphics are nearly transverse to the axis of the valley. In them are veins of copper ore. Directly across the valley, and having the same trend as the metamorphics, are copper-bearing veins in granite. Other veins are found also in the western range north of the ones already mentioned. The relation of the character of the veins to the different kinds of country rock is discussed.

"The Physiography of Southern Arizona and New Mexico," by Harold W. Fairbanks, University of California. The great plains of Southern Arizona and New Mexico are extremely interesting. They stretch eastward from Yuma, where they are but slightly elevated above the sea, to Southeastern Arizona, where they attain an elevation of nearly 5,000 feet. From this point the plains gradually decrease in elevation to about 4,000 at El Paso, and are supposed to extend completely across to the Gulf of Mexico.

The plains are dotted with mountain peaks and ranges which in most cases rise very steeply, and along the continental divide break up the plain to such an extent as to nearly form inclosed basins.

The plains themselves in their vast, almost level, surfaces and their well stratified clayey material have every appearance of having been formed in bodies of water, rather than through stream action. Their surfaces are very different from those of stream accumulation in other portions of the arid region.

The materials forming the plains are but slightly consolidated and have every appearance of belonging in the Pliocene or Pleistocene periods. In some portions extensive lava flows appear to have taken place during their deposition.

A reconnoissance over this region led to the belief that the ocean extended across the continent in this latitude during the late Tertiary, and that the arching of the crust which permitted the cutting of the cañon of the Colorado, also elevated the former nearly level sea floor to the position it now occupies.

"Physiography and Geology of the Siskiyou Range," by F. M. Anderson, University of California. The range follows approximately the boundary between Oregon and California, dividing the drainages of the Klamath and Rogue Rivers, and both from the drainage of Smith River. The topography of the range is full of suggestion as to its dynamic history. The main features of the topography suggest systems of transverse folds, one of which is older than the other. There is also evidence capable of the same interpretation in other features of the country, as in the gravels of the Klamath River. The areal geology of the range consists of an alternate succession of igneous and sedimentary, or metamorphic belts, extending in a north and south direction at right angles to its major axis. The interpretation of this interesting phenomenon is in accord with that of the topography, and is taken as a proof of the complex, or *duplex*, folding of the country. The axis of the range is an expression of an earlier system of folding, and the direction of the geological zones is that of a later system. Both systems are to be recognized in other features of the country. There is a variety of both igneous and metamorphic rocks, and several classes of sedimentary rocks. The igneous types range from ultra-basic to acid, and are mainly deep-seated, though there are occurrences of ancient lavas of medium basic character.

"The Genesis of Ore Deposits in Boulder County, Colo.," by Rufus M. Bagg, Jr., Brockton, Mass. The geology of Boulder County is outlined. The formation of veins is considered. The writer describes the occurrence of fissure veins along irregular fracture zones which, after faulting, have been secondarily filled with solutions and sublimation products, chiefly the tellurides of gold, mercury, and the sulphide of iron, marcasite. The genesis of these rich ore pockets is discussed. A description of some of the principal mines is given. Summary of field observations by the writer when examining mines in the district.

THE COLLAPSE OF THE WHITAKER WRIGHT COMPANIES.

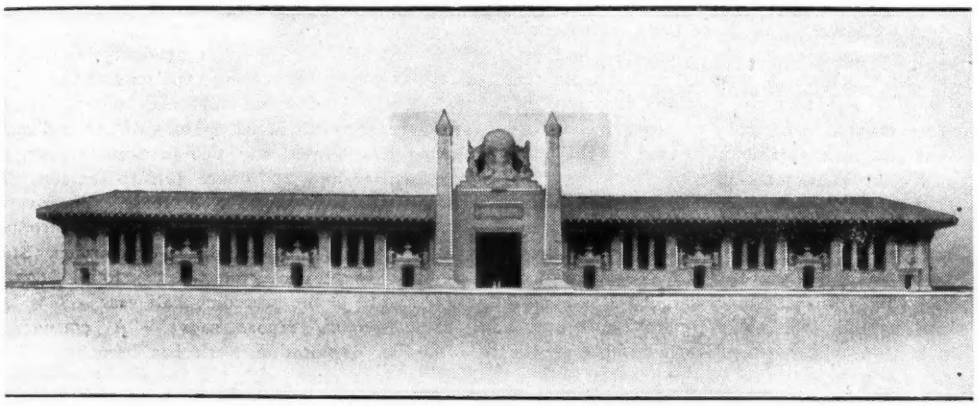
BY OUR SPECIAL CORRESPONDENT.

I have referred several times recently in my London letter to the endeavors that are being made among shareholders and creditors of the various Whitaker Wright companies to induce the public prosecutor to take steps against Mr. Whitaker Wright and his fellow directors. All such efforts have so far been in vain, and the law officers of the Crown have recently definitely announced that there is no reason for them to take up the matter. Seeing that more than one judge has characterized certain transactions in connection with these companies as fraudulent, it is a matter of wonder on the part of the average city man that the public prosecutor has remained inactive. Some light is thrown on the attitude of the officials by the report just issued by the Board of Trade on the winding up of public companies during the past year. The officials consider that shareholders and speculators in general were perfectly aware of the wild speculations that they were entering into, when they went in with Mr. Whitaker Wright, and they do not offer them the least sympathy in their misfortunes. The following extracts from the official report explain the attitude of the Government:

"The circumstances attending the management and failure of these companies have been fully investigated by public examination in court, of the persons responsible, and although the evidence is of a somewhat voluminous character, the causes of the failure may be stated in the briefest terms. The object of the London & Globe Company was, according to its memorandum of association, to engage in 'all kinds of financial operations,' and that of the British America Corporation and the Standard Exploration Company was practically the same. The shareholders knew this, but reposed absolute confidence in the directors. So long as large profits were made it mattered not to them how they were made. But they must have known that the business was of the most speculative character. Whether the gigantic paper profits made by the companies were produced by gambling on the Stock Exchange, or by the creation of new companies with inflated

paper capital, which was treated as real, appears in this respect to be immaterial. The shareholders either knew the general nature of the business, or they were content to receive the benefit of very abnormal profits without injury, and in implicit reliance upon the directors. The directors, on the other hand, according to their own admissions, left the entire control of these financial operations in the hands of the managing director, and while accepting large fees as directors, either neglected to inform themselves as to what he was doing or concurred in his operations. The managing director, being thus entrusted with plenary power to enter upon 'all kinds of financial transactions,' entered on an extensive promotion of new companies and conducted a series of gigantic operations on the Stock Exchange. Some of these yielded a large profit, while others resulted in losses, which proved the ruin of the companies concerned. The funds of the companies were also employed to a considerable extent in the purchase of each others' shares. Mr. Whitaker Wright was the managing director of all the three companies referred to, and this concentration of management, and the lack of any real control in the conduct of the operations, afforded great facilities for speculative operations of a dangerous character, while the purchase of large quantities of shares could not fail to affect their market price."

These remarks seem like ancient history, but it is just as well to put the official statement on record. Ever since Mr. Whitaker Wright began his career in London I have continually pointed out in my London letter and in other parts of the JOURNAL the hollowness of all these mighty transactions, so that your readers are not likely to have been victims of the craze. At the present time there is hardly any enterprise in the London Mining Market, and the disinclination of people with money to take up speculation in mines is traceable in some degree to the ridiculous fiasco of the Whitaker Wright collapse.



MINES BUILDING AT THE ST. LOUIS EXPOSITION.

SPELTER IN EUROPE IN 1902.

The spelter production of Upper Silesia in 1902, according to *Chemiker Zeitung*, is estimated at about 113,000 metric tons. (In 1901 it was 107,967 tons.) The average quarterly price for the metal in that Province, basis works, was as follows (in marks per 1,000 kilograms):

Year.	I	II	III	IV
1898	330	350	380	440
1899	500	520	450	390
1900	400	400	360	350
1901	320	310	300	300
1902	320	340	350	360

The price for sheet zinc rose from 42 marks per 100 kilograms at the beginning of the year to 46 marks, basis Oberhausen, at the end. Since October 1 the Kunigunde rolling mill, previously idle, has been in operation, and the new mill of Count Hugo Henckel at Antonienhutte has been completed, the Piela mill being surrendered to the Schlesische Aktien Gesellschaft.

The market for cadmium was quiet throughout the year, the price ranging from 525 to 575 marks per 100 kilograms, according to quantity and quality.

ZINC ORE IN TUNIS.—Deposits of zinc and lead ore occur near Teboursouk, Beja and Souk-el-Arba in the north of the colony, generally in Cretaceous limestone. The ores are chiefly calamine, galena and cerussite. The mining industry is in its infancy, but a fair showing has already been made (British Foreign Office *Report* No. 2915, Annual Series).

NEW USE FOR MOLYBDENUM.—According to E. Pozzi-Escot (*Comptes Rendus*, CXXXV, 880) molybdenum produces fast shades on leather, just as titanium does. Molybdenum tannate has a great affinity for animal fiber. It is naturally of a deep yellow color, but a large variety of shades may be obtained by employing it in connection with logwood extracts.

MINES AND METALLURGY AT THE ST. LOUIS EXPOSITION.

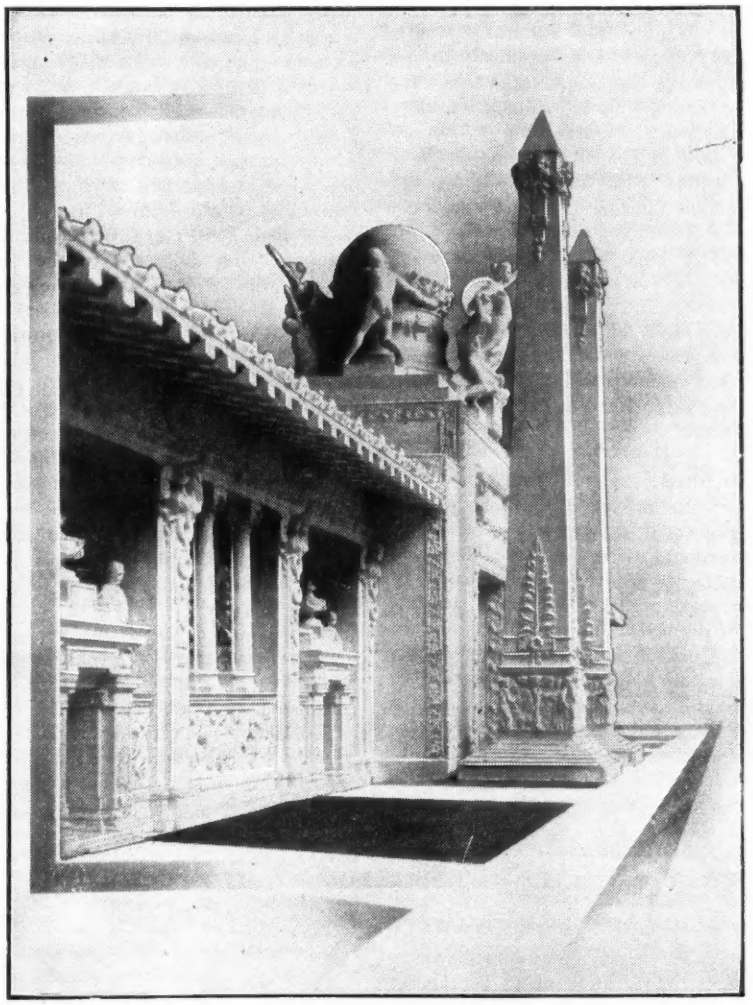
The achievements, history and possibilities of Mining and Metallurgy are to receive special attention, extensive treatment and suitable display at the Universal Exposition at St. Louis, 1904. The authorities of the Exposition have given a leading place to the various materials and industries which are included under this heading, such as working of mines; ore-beds and stone quarries; minerals and stones and their utilization; mine models, maps, photographs; metallurgy; literature of mining, metallurgy, etc. These will be in one of the principal departments, a special building for which is being erected.

The site of the Exposition embraces about 1,200 acres of park territory adjoining further rich park land on one side and faced by rolling country and stretches of fine residences.

The mines and metallurgy exhibits will be presented in fifteen separate departments. They will be arranged in special classes, under the following general heads:

1. Working of Mines, Ore-beds and Stone Quarries (equipment and processes).
2. Mine Models, Maps, Photographs.
3. Metallurgy (equipment, processes and products).
4. Literature of Mining, Metallurgy, etc.

There will be no charge for space occupied by exhibits, and a limited amount of power for the operation of mechanical devices to illustrate processes of special interest will be furnished to exhibitors without charge.



ENTRANCE TO MINES BUILDING, ST. LOUIS.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON FIRE-BRICKS.—Undecorated fire-brick weighing more than 10 pounds each, and designed for linings for coke ovens, are dutiable under paragraph 87, tariff act of 1897, at the rate of $1.25 per ton, as assimilating, under section 7 of said act, to undecorated fire-brick weighing not more than 10 pounds each; and not dutiable under paragraph 97 of said act as assimilating to fire brick weighing more than 10 pounds, which are susceptible of decoration.—Appeal of Solvay Process Company from Collector of Customs at New York; Board of General Appraisers.

WHEN ONE CANNOT RECOVER ON SALE OF MINE.—One who examines a mine and makes a report on same for an owner, under a contract that he shall receive a certain amount therefor if a sale is effected, "by and through" the report cannot recover on evidence showing merely that one to whom such report was furnished, with other reports of a similar nature, became the purchasers.—Wishon v. Great Western Mining Company (69 *Pacific Reporter,* 1106); Supreme Court of Washington.

THINGS THAT PROVE THEMSELVES AND WAIVERS BY NOT OBJECTING.—In a suit based on adverse claim to a mining location an allegation that the adverse had been received and filed in the land office created the assumption that it was filed within the 60 days rquired by the Federal statutes. When in such an action the defendant went to trial without objecting by demurrer or answer that the adverse was not filed within such time, or that the complaint was not filed within 30 days after the filing of the adverse in the land office, such objections were waived. Where the complaint alleged that the adverse was filed September 17 and the file mark showed that the complaint was filed October 3, within the 30 days required by statute, and the court took judicial notice of the file mark, the complaint sufficiently showed that it was filed within the 30 days from the filing of the adverse, without an express allegation to that effect.—Pennsylvania Mining Company v. Bales (60 *Pacific Reporter,* 444); Court of Appeals of Colorado.

WHAT MAY BE SHOWN BY PLAINTIFF SUING FOR DEATH OF MINER.—In an action for damages for death by wrongful act it is proper to receive evidence of whatever facts made the life of deceased of pecuniary value to the survivors entitled to sue and recover damages for the death, including the ability of deceased to earn or accumulate property; his disposition to contribute support; his condition of health; the probable duration of his life; and also the number, age, sex and health or condition in life of his surviving children depending on him for care, support, education and maintenance.—Coffeeville Mining and Gas Company v. Carter (70 *Pacific Reporter,* 635); Supreme Court of Kansas.

ABSTRACTS OF OFFICIAL REPORTS.

British Ore Concentration Syndicate, Limited.

The report of this company, just issued, covers the period from its organization up to September 30, 1902. The company owns the patents covering the Elmore oil concentration process in Great Britain. Its capital consists of 100,000 shares of £1 each, of which 85,007 have been issued. The total expenditure to date, including £60,000 paid for the patents and £11,718 for mining property, has been £79,540.

The directors' report says: "The patents have now been transferred to the company, and substantial progress has been made in furtherance of the objects for which the syndicate was primarily formed. The syndicate's patented process has already been adopted by the St. David's Gold & Copper Mines, Limited, at their mine in Wales; and by Messrs. Bainbridge, Seymour & Co., at their Tywarnhaile Mine in Cornwall; in each case with satisfactory results. A high extraction of the valuable part of the ore treated has been secured, and the running of both plants is all that can be desired. The continued successful working of the St. David's and Tywarnhaile plants should prove of the utmost value to this syndicate, as demonstrating to those mine owners who have not yet adopted it, the simplicity and efficacy of the process. It is to be remembered that these two plants are large working installations, having an estimated capacity of 1,200 tons of ore per week, which is further increased by the plant on the Sygun Mine referred to below; together, say, 1,700 to 1,800 tons per week. Royalties are now accruing from the St. David's Mines, and in the case of the Tywarnhaile Mine have been commuted for a direct interest in the property. Agencies for Merionethshire, and for Devon and Cornwall, have been established, and our agent in the latter district reports that there is a probability of the early adoption of the process by several of the mines there.

"An agreement was entered into on March 21, 1901, for a working option over the Sygun & Cribb Dhu copper mines, situated at Beddgelert, North Wales, which option was subsequently extended, and expires on September 1, 1903. The same agreement also granted an option over the Great Aran and Snowdon properties adjoining, which option expires on the same date. At the Sygun & Cribb Dhu mines the directors are pleased to be able to state that; as a result of development work, a large body of copper ore has been rendered available, and means of transport provided from the various faces to the mill, which has just been completed. This latter comprises a Fraser & Chalmers' 20-head battery, and four units of oil plant, with all the necessary accessories. This plant is automatic throughout, the ore being delivered to the stonebreaker at the top and the concentrates being bagged at the bottom without any intermediate handling, and it is capable of dealing with 100 tons per 24 hours. The directors had hoped to have the mill in full operation before the date of this report, but have been disappointed, owing principally to the weather, which has hindered building operations. The plant has now, however, been put into regular operation on one shift, and it is confidently anticipated that it will be in continuous work with three shifts very shortly. The whole installation has been well designed, carefully made and erected, and was put to work practically without a hitch.

"In addition to the above, various options have been acquired over different properties in England, Wales and Ireland, and those showing promise have been retained.

"To enable the directors to deal with these and other properties which may be brought to their notice from time to time, they consider it advisable to strengthen the resources of the syndicate, and therefore recommend the increase of the company's capital to £150,000."

Mount Lyell Mining and Railway Company, Tasmania.

The latest report of this company, which covers the half year ending September 30, 1902, shows the total receipts from metal sold £268,569 and from railroad traffic £15,756, making a total of £284,325. Expenses of all kinds were £207,211, leaving a net balance for the half year of £77,114. The mining report shows that from the Mount Lyell there were taken 159,634 dry tons of ore, of which 154,152 tons were from the open-cut workings and 5,482 tons from underground workings. Exploration work for the year included 595 feet of drives and cross-cuts, 189 ft. of sinking and 1,201 ft. of diamond drill boring. Some exploration work was also done on the outside properties owned by the company. The quantity of ore treated by the smelter during the half year was 183,676 tons. This included 159,450 tons from the Mount Lyell mine; 18,537 tons of metal-bearing flux from the South Tharsis and the Royal Tharsis; and 5,689 tons of purchased ore. In addition to this there were passed through the smelters 3,558 tons of flue dust, 47,963 of first matte, and 5,802 tons of converter slags and lining. This brought the total dry weight of material treated in the smelter up to 240,999 tons. The matte sent to the converters was 8,858 tons and the converter product was 364 tons of blister copper, containing 3,608 tons of fine copper, 341,346 ounces of silver and 11,681 ounces of gold. The average result based on tons of ore and metal-bearing flux treated was 1.96 per cent copper, 1.86 ounces silver and 0.06 ounce gold to the ton. The cost of treatment shows a decrease. The average for the half year per ton of blister copper produced was: Mining and removing overburden, $1.00; smelting, $3.37; converting, $0.36; total, $4.73, as against $5.10 in the preceding half year.

The directors' report says: "A considerable amount of exploration work has been carried on, both in connection with the principal ore-body as well as on several of the more recently acquired properties. To facilitate this work use has been made of the diamond drill, which has been found serviceable and expeditious. It is intended to adopt to a further extent the above means of carrying on this exploration work.

"These operations have not so far, however, disclosed anything of importance, and, although the rich ore worked in the upper levels of the main property was met with at the No. 8 Level, it has unfortunately not proved to be of any large extent. The South and Royal Tharsis properties have continued to provide considerable quantities of metal-bearing flux, the South Tharsis mine being the chief source of this supply. During the half-year the leases formerly owned by the North Crown Lyell and the Central Lyell companies have been acquired by this company, and on these exploration work is being undertaken.

"The furnaces during the period under review treated 159,450 tons of pyritic ore, or 22,651 tons more than during the previous six months, but the copper value of the ore was slightly lower than that furnaced during the former period, gold and silver, however, being somewhat higher. The quantity of metal-bearing fluxes used amounted to 18,537 tons, being an increase of 4,355 tons over that treated during the previous half-year. In addition to the above, 5,689 tons of ore purchased from some of the outside mines have been treated, but these ores show a considerable falling off, owing to the completion of the North Lyell contract early in the half-year, and to other local conditions. The reduced tonnage of purchased ore has, however, been offset by the larger quantity of open-cut ore, which has been treated. . . .

"At the Port Kembla coke works, the output of coke for the half-year was 8,591 tons. Having established large reserves of coke at the reduction works, the disastrous explosion which occurred at the Mount Kembla colliery, though temporarily suspending the usual source of coal supply, did not in any way interfere with the company's smelting operations.

"The directors have to report that they have arranged on very satisfactory terms, a three years' extension of the existing American contract for the refining of the company's blister copper, and have also renewed the agreement for the sale of the company's refined copper and silver, which has so far proved entirely satisfactory.

"After writing off £1.375 for dividend and income taxes, £18.577 for depreciation on the company's plant, and £5,628 for prospecting work which has not been debited to mine preparatory works overburden account, the net profit for the half-year amounts to £45,348, being £7,700 less than for the previous half-year, which is due to the less favorable rates which have ruled for copper, and the decrease in the quantity of purchased ore treated. During

the period covered by the report, the average price which ruled for G. M. B. copper was £53 2s 6d, as against £56 12s 6d for the previous six months.

"The sum of £34,375 has been disbursed in dividends during the half-year, 1s 6d per share having been paid on April 1 and 1s per share on July 1, the former dividend being paid out of profits earned during the previous half-year. In addition to the above, a dividend of 1s per share, amounting to £13,750, was declared during the half-year, but was paid on October 1. The total amount in dividends paid to date up to and including the one paid on October 1 aggregates £896,887. The liquid assets of the company, exclusive of stores, coke, coal, etc., and after allowing for all liabilities, represent a total of £209,288."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Hardening, Tempering, Annealing and Forging of Steel. By Joseph V. Woodworth. New York; Norman W. Henley & Co. Pages, 280; illustrated. Price, $2.50.

A Treatise on Roads and Pavements. By Prof. Ira Osborn Baker. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 664; illustrated. Price, $5.

Dies. Their Construction and Use for the Modern Working of Sheet Metals. By Joseph V. Woodworth. New York; Norman W. Henley & Co. Pages, 384; illustrated. Price, $3.

Fuller's Earth. Its Properties and Therapeutic Qualities. By Dr. H. B. Hilgeman. Reprint of paper read before the Medical Society at Hot Springs, Ark. Pamphlet, 8 pages.

Economical Gas and Its Application to Lighting, Heating and Motive Power. By J. A. de Clercy. Montreal, Canada; published by the author. Pamphlet, 12 pages; with illustrations.

A Unit of Electrical Quantity for Use in Electrochemical Calculations. By Alfred H. Cowles. Reprinted from *Transactions* of the American Electrochemical Society. Pamphlet, 121 pages.

The Thermodynamics of Heat Engines.. By Prof. Sidney A. Reeve. New York; the Macmillan Company. London; Macmillan & Company, Limited. Pages, 372; with diagrams and tables. Price, $2.60.

Hydrographic Maps of Wisconsin Lakes. From Surveys by L. S. Smith and H. M. Trippe. Madison, Wis.; the Wisconsin Geological and Natural History Survey. Nine sheets, each in separate cover.

The Lakes of Southeastern Wisconsin. By Dr. N. M. Fenneman. Being *Bulletin VIII*, Wisconsin Geological and Natural History Survey. Madison, Wis.; published by the Survey. Pages, 180; illustrated.

BOOKS REVIEWED.

With its issue of December 27, 1902, our esteemed contemporary, the *Oesterreichische Zeitschrift für Berg-und Hüttenwesen* celebrated its fiftieth anniversary. This excellent journal was founded by Freiherr Otto von Hingenau and was edited by him until his death in 1872. Adolf Patera and Aegyd Jarolimek conducted the journal until 1876, in which year the former retired, while the latter continued alone up to the end of 1880, when he was succeeded by Hans Höfer, who is the editor at the present time in conjunction with Carl von Ernst. During the 50 years of its existence our contemporary has included among its contributors the best names in geology, mining and metallurgy in Austria, including Rittinger, Tunner, Grimm, Franz and Julius von Hauer, Kupelwieser and Posepny, and had stood for all that is best in the advancement of the science and arts which it represents. We extend to it our best wishes for another successful half-century.

With the opening of 1903 the *Aluminum World* has been incorporated with the *Metal Industry*, and the combined publication will appear monthly, in an enlarged and improved form. The paper will treat of practical questions relating to other non-ferrous metals besides aluminum; including copper, tin, lead, zinc, nickel and their various alloys. The change is opportune, since the time has come when it is no longer possible to treat of aluminum alone, without including the other metals with which it is so frequently used to form alloys. We wish our contemporary all success in its larger field.

Annual Report of the United Mine Inspector of the Territory of New Mexico, 1902. J. E. Sheridan, Mine Inspector. Washington; Government Printing Office. Pages, 104; with maps and illustrations.

This report, which covers the fiscal year ending June 30, 1902, gives many interesting particulars in relation to the coal mines of New Mexico. The actual production for the year was 1,132,944 tons. This could be considerably increased from the mines already in operation, and could be very largely increased by exploration and opening of mines on the coal deposits known to exist, but still untouched. New Mexico is well supplied with coal, and there are large areas upon which no work has yet been done. The production showed a decrease last year as compared with 1901, chiefly because some of the railroads, which have been large customers of the mines, reduced their consumption owing to the substitution of crude oil for coal in many locomotives. New Mexican mines were thus brought into competition with oil from both Texas and California; these mines occupying the intermediate territory between the two oil-fields.

The report discusses these questions very fairly, and also calls attention to several amendments, which would increase the efficiency of the United States law governing the operation and inspection of mines in the territories.

Locomotives: Simple, Compound and Electric. Fourth Edition, 1902. By H. C. Reagan. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 618; with 309 illustrations. Price, $2.50.

This is a new edition of a book first published eight years ago. It is intended chiefly for those practically concerned in the operation, care and maintenance of locomotives. The additions in the present edition relate chiefly to recent improvements, such as the compound locomotive, the use of liquid fuel for locomotives and improvements in electric motors. It would have been well if some further revision had been given. Thus the pages devoted to describing the Reading single-driven engine—an experiment not likely to develop into a type—might have been better used. It is a pity that the author should have selected as a type of the modern French locomotive the machine from the Paris, Lyons & Mediterranean Railroad, with its "freak" attachments, shown on page 235, when illustrations and descriptions are available of such admirable examples of design and construction as the four-cylinder compounds introduced by M. Paul du Bousquet on the Northern Railroad of France—probably the most efficient type of locomotive now running. The book, however, contains a great deal that is practical and useful.

Ancient and Modern Engineering and the Isthmian Canal. By Prof. William H. Burr. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 488; illustrated. Price, $3.50, net.

This book is a comprehensive statement of matters both technical and non-technical, interesting to all members of the engineering profession in all its branches. A valuable feature is the first part, relating to ancient engineering. The author has availed himself of the results of the most modern and thorough investigations in the Assyrian and Egyptian localities, so far as they relate to structures and other engineering works completed before the beginnings of history. The engineering works of the Romans are also considered at length and set forth in such a manner as to exhibit principles of engineering practice as they were understood and applied by Roman engineers and architects.

The part devoted to the consideration of bridges has much historical interest. It treats in sufficient detail to indicate practical applications such improved and advanced methods of design as influence lines and principle of least work. It also includes concrete-steel structures and long-span bridges of both the suspension and cantilever types, together with detailed data of the most prominent structures, including the longest arch spans yet built. Those parts devoted to railroad engineering and city water works cover in a comprehensive manner the main features of those fields of engineering practice. Railroad location, signaling, and locomotives, profusely illustrated in the third part, as well as all the principal features of water supply for cities and towns, including filtration and other sanitary operations, abundantly illustrated in the fourth part, are set forth in a manner to be in a high degree practically valuable.

Probably of even more interest at the present time will be found the last two parts, on the two great competing routes for the Isthmian Canal, the Panama and the Nicaragua. A map of the entire Central American Isthmus shows all the proposed routes, with the principal points on each route. The author, as a member of the Isthmian Canal Commission, made personal examinations on both the Panama and Nicaragua routes, and there will be found complete engineering data for both lines on which the final conclusions of the Commission were based. Plans and estimates of quantities, showing the complete estimates of costs on both routes, are given in detail. The half-tone illustrations are all made from actual photographs of the localities indicated by members of the engineering force of the Isthmian Canal Commission. It is the most comprehensive and satisfactory statement of the Isthmian problem which has yet been made, from the engineer's point of view.

What strikes one most in reading this book is the wide range of subjects which it covers, and of which the writer speaks, not superficially, but evidently with thorough knowledge. Few men could do it, but the author has succeeded, not only in conveying technical information on many diverse points, but in doing it also in an agreeable way, and in a style which leaves little to be desired by the critic.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Metric System.

SIR:—I wish to call attention to what I must consider the discourteous tone of the note which appeared in the JOURNAL of December 27, concerning the meeting of the Society of Mechanical Engineers and of the discussion of the metric system. It strikes one familiar with the subject as preposterous that a mining engineer should lecture the entire body of those constituting a totally different profession upon the system of measures which they prefer to use, or which meet the needs of their profession.

The note in question in the first place is inaccurate in the impression it gives, that the action taken was unfavorable to the metric system, and more so in the impression that it gives that such action as was taken in default of the presence of a representative number of metric advocates, the facts being that a motion to submit to a mail ballot the matter of the society's attitude concerning the metric system was

carried after a very full and free discussion, in which the metric advocates took full part, and due notice of which they had had from the previous day, so that presumably a representative number of those on both sides, sufficiently interested to be present, attended.

The point upon which most enlightenment is needed by the world at large, and especially, apparently, by some engineers others than mechanical, is that this is a matter in which mechanical engineers are concerned to the extent of $10, or very probably $100, to every $1 for all the other branches of engineering put together.

The writer has great interest in mining engineering himself, being the engineer and also in executive charge of underground mines of considerable extent, and employing about 200 men, and as far as this side of his work is concerned, he is very well aware that the only difficulty in introducing the metric system would be the purely personal one, of learning to think in kilograms and meters instead of pounds and feet. The expense involved for tools and implements to make the change would be that necessary to buy new tapes, leveling rods and other linear measures, an amount of entire insignificance,—if there were any advantage to be attained by the change. It so happens, however, that the writer has also to do with a great deal of mechanical engineering work, and was, in fact, trained, after leaving college, in modern machine shop practice, not as a dilettante, but as a profession. He is, therefore, not willing to admit the general assumption, so pronounced in the editorial note referred to, that all the branches of engineering have an equal right to be heard and an equal interest in this matter of the standard of measurement. The amount of capital invested in gauges of all sorts and description, cutters, tools, boring heads, etc., in a modern machine shop, all of which would be thrown away as absolutely as though they were thrown in the sea, by a change in the system, is something of which the average man, even the average civil or mining engineer, has no conception whatever.

That this is not a distorted view may perhaps be illustrated by an instance of recent occurrence. The writer was making a business visit at the shop of one of the most distinguished and successful mechanical engineers of to-day, a gentleman himself a foreigner, and, as he stated, trained in the use of the metric system. In the tool room of the shop the writer commented on the magnificent series of hardened and ground "plug and ring" gauges, and asked, in view of the discussion of two weeks previous, what would be the value of those if the metric system was introduced. The manager and proprietor of whom I have just spoken, shook his head with a quizzical look, but said nothing. The writer then asked: "What do you think of that matter?" He replied: "The metric system would be very nice if we could have it; of course, I was brought up to it, but we cannot afford it."

This fact that mechanical engineers have many times more at stake than all the other engineering societies put together cannot be too strenuously expressed. For that reason the writer opposed at the meeting of the mechanical engineers the proposition that the Civil Engineers, Mining Engineers, Electrical Engineers, Franklin Institute and Association for the Advancement of Science, as well as the Mechanical Engineers should each send an equal number of representatives to a committee to canvass this situation. Such a state of affairs in this particular matter would bring things to the often-deplored past wherein the tail wags the dog.

It was an interesting fact that the very earnest and entirely ignorant Congressman who represented the metric system at the meeting under question, declared that the Government Survey was excepted from the operation of the law compelling the use of the metric system in all government matters for the reason that it was a great work, and had cost an enormous amount of money, and was now nearly completed. I could not help but wonder how many hundred times the hundreds of thousand of other great works of every description, which would be as much or more injured by the proposed system, out-weighed this great work in value.

J. E. JOHNSON, JR.

Longdale, Va., Jan. 2, 1902.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Traction Resistance of Mine Cars.—Can you give me any facts as to the traction resistance of ordinary mine cars? I mean the force or pull required to move such cars of any given weight.—J. Q. T.

Answer.—A common assumption is that mine car resistance to traction is about 20 pounds per short ton. The experiments on traction resistance of cars have been made almost entirely with ordinary freight cars on tracks laid with heavy rails, ballasted, and with ties 2 to 2½ feet center to center. Mine tracks are in very different condition, as most engineers know. Moreover, the smaller size of mine car wheels and journals must be taken into account. We find the *Engineering News* of January 15 an article on this subject which gives some valuable information on this point, as follows:

"Mr. R. Van A. Norris, Assistant Engineer Susquehanna Coal Company, some years ago made a very exhaustive series of tests (989 tests) on the resistance of coal mine cars. Two styles of car axles were use, one old style, and the other new style, patented by Mr. Jas. H. Bowden. In both styles the wheel was 16 inches diameter, tread to tread, with axles passing loosely through fixed boxes. The journal of the old style was steel, 2⅜ inches diameter; of the new style, 2½ inches diameter and 5¼ inches long. Each car was carefully oiled. The track was a perfectly straight level piece of 42 inches gage, about 200 feet long, and in rather better condition than the average mine track. The weight of the rails is, unfortunately, not given. The cars were 41¾ inches gage, 3½ feet wheel base, 10 feet long, weight 2,140 to 2,240 pounds empty and 7,900 to 9,000 pounds loaded. As a summary of the tests we have the following:

	Pounds per ton of 2,000 lbs.
To start one old style car loaded	90
To start one new style car loaded	47
To start one old style car empty	77
To start one new style car empty	49
To pull one old style car loaded at ¼ mile hour	52
To pull one new style car loaded at ¼ mile hour	32½
To pull one old style car empty at ¼ mile hour	51
To pull one new style car empty at ¼ mile hour	33
To pull one to four old style cars loaded 4½ miles hr.	66
To pull one to four new style cars loaded 4½ miles hr.	38
To pull one to four old style cars empty 4½ miles hr.	56
To pull one to four new style cars empty 4½ miles hr	30
To pull 20 old style cars loaded 4½ miles hour	26
To pull 20 old style cars empty 4½ miles hour	42

"One of the most striking features of this summary of tests is that the resistance per ton of a train of 20 loaded cars (old style) is 26 pounds per ton, as compared with 66 pounds per ton for a 1 to 4-car train. This brings out a fact that we have never seen mentioned as being of importance in tests of this character, namely, the lower per-ton resistance of a long train of mine cars as compared with a single car. In the ordinary so-called level mine track there are numerous waves forming up and down grades; and in a long train of cars, some are coasting down these waves while others are ascending, so that those going down are pushing those going up hill, consequently reducing the pull on the locomotive draw-bar.

"Another, and perhaps even more important factor may enter to reduce the per-ton resistance of a long train; and that is the action of the forward cars in cleaning the track. Fragments of coal and rock fall upon the track, and these the first few cars must crush; but the jarring of these forward cars may in large measure cause this powdered material to fall off the rails. Mine car tracks, as well as contractor's car tracks, are always more or less covered with powdered rock and earth, and from other experiments we may safely conclude that this dust forms a very material source of resistance to traction. This being so, we raise this question: 'Will it not pay well not only to use care in bedding the ties, and in alining a mine car track, but also to provide a brushing device attached to the front of a mine car to remove powdered material from the rails?'

"As a result of the foregoing we may say that the engineer who in estimating uses a 20-pound resistance per ton of mine car load is far below the actual resistance ordinarily encountered, which is 1½ to 2½ times 20, or say 40 pounds, as an average on a fairly level, fairly dirty mine track."

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

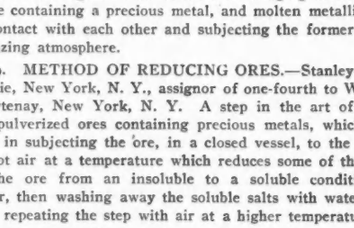
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon receipt of 25 cents.

Week Ending January 13, 1903.

718,075. LIME OR CEMENT KILN.—Chester S. Batchelder, Spokane, Wash. A lime or cement stack kiln having its calcining chamber provided with a water-jacketed contracted lower end, and a constantly-moving conveyer at the lower end of the said chamber whereby an uninterrupted feed of material through the chamber is obtained.

718,077. TILE OR BRICK CUTTING MACHINE.—Jacob Bensing, Malinta, Ohio. The combination with a revolving cutter and a subjacent frame having an endless track, of a carrier consisting of a series of flexibly-connected sections, each section comprising a supporting bar and guide standards, said standards comprising a main upright member having a lug near its upper extremity and a dependent upright member adapted to lap the side of the main upright member of the adjacent section and abut against said lug thereon.

718,088. PROCESS OF SEPARATING PRECIOUS METALS FROM ORES.—Franklin R. Carpenter, Denver, Colo., assignor of one-half to Joseph H. Berry, Detroit,



Mich. A process of separating a precious metal from iron matte containing it which consists in bringing molten iron matte containing a precious metal, and molten metallic lead in contact with each other and subjecting the former to an oxidizing atmosphere.

718,099. METHOD OF REDUCING ORES.—Stanley C. C. Currie, New York, N. Y., assignor of one-fourth to William Courtenay, New York, N. Y. A step in the art of treating pulverized ores containing precious metals, which consists in subjecting the ore, in a closed vessel, to the action of hot air at a temperature which reduces some of the salts in the ore from an insoluble to a soluble condition in water, then washing away the soluble salts with water, and then repeating the step with air at a higher temperature.

718,112. WELL DRILLING MACHINE.—Henry H. Everhard, Massillon, Ohio. In a well drilling machine, a suitable frame, a crank shaft journaled thereto, a shaft located to one side of a horizontal plane through the power shaft, said shaft provided with links, swinging arms, a cross bar connected to the links and to the swinging arms, an axle carried by the free ends of the swinging arms, and said axle provided with a drill-operating rope wheel, an actuating pitman, and means for adjusting the pivoted ends of the swinging arms.

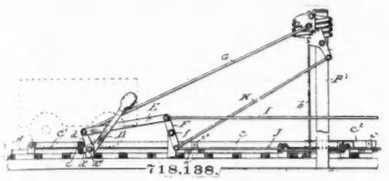
718,128. MINER'S LAMP.—John Jacobsen, Lethbridge, Canada, assignor of one-half to Gustaf A. Nordquist, Great Falls, Mont. In a miner's lamp, the combination with a

plate or bracket having an upper rearwardly curved top securable to the cap and a forwardly curved bottom end securable upon the vizor of the cap, and intermediate its ends forwardly projecting cheek plates having downwardly and forwardly slanting notches, of a lamp having side trunnions

adapted to rest in said notches; and friction held hooks closing the notches to prevent accidental displacement of the trunnions.

718,132. RECIPROCATING PUMP.—Frederick Lamplough, Willesden, London, England. In a pump, the combination with the pump barrel, a ram adapted to reciprocate therein with uniform strokes, and inlet and delivery valves; of a relief valve, of a by-pass from the pump barrel controlled by said relief valve, and of means for varying the period of lift of the relief valve in relation to the stroke, and thereby gradually and automatically diminishing the supply of water as a predetermined pressure is reached.

718,188. MINE GATE.—John M. Marty, Cleveland, Ohio, assignor of one-half to Charles J. Diebold, Cleveland, Ohio. In a mine gate, the combination with the track rail of a secondary rail mounted above the track rail, a weighted lever connected with the secondary rail, a folding curtain mounted



between lazy tongs supported in a frame, and rods connecting said lazy tongs with said secondary rail and weighted lever, whereby the weight of the approaching car will raise the curtain and the weighted lever will lower the curtain as the car is removed.

718,160. LADLE CRANE.—Fred A. Rundle, Harvey, Ill. In a ladle crane the combination of a movable carriage, a winding mechanism carried by said carriage, a frame or beam below said carriage adapted to have a ladle secured thereto, two ropes so connecting each end of said frame to the winding mechanism above it that as said winding mechanism is operated the frame is moved up and down in a position always substantially parallel to its first position, and mechanism for adjusting the tension of one of said ropes at each end of the frame whereby the whole load may be carried by one of said ropes while the other rope carries substantially none of the load.

718,222. PROCESS OF REDUCING ZINC FROM ITS OXIDES, ETC.—Wilhelm Schulte, Overpelt-lez-Neerpelt, near Limburg, Belgium. A process for smelting oxidized zinc ores which consists in impregnating the ore with hydrocarbons, mixing it with a quantity of coal less than necessary for effecting alone a reduction of the ore, and then distilling the mixture.

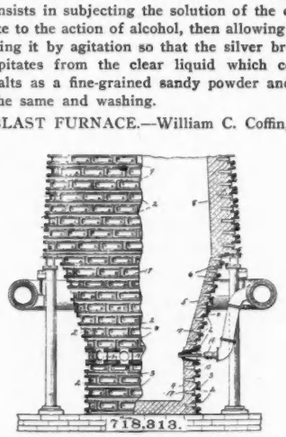
718,249. ELECTROLYTIC APPARATUS.—Max Haas, Aue, Germany. In electrolytic apparatus, the combination of a vessel, bi-polar electrodes dividing this vessel in several compartments, long narrow channels manufactured of an insulating material connecting these compartments, said channels forming the only liquid connection between these compartments.

718,276. DREDGER.—Raymond A. Perry, Oakland, Cal. The combination in a dredge of a hull, a ladder consisting of forked sides extending upon opposite sides of the vessel's end, means for pivoting these sides to the vessel, an extension outward from the junction of these sides and excavating and suction mechanism carried upon said ladder.

718,306. COUPLING FOR PUMP RODS.—Amos E. Boring, Canton, Ohio. A coupling for pump rods consisting of rod sections one of said sections provided with a socket head and the other with a head to be received into the socket head, a recess leading from the socket of the socket head and a neck normally located in the recess and a hinged section adapted to close the opening of the socket head.

718,312. SILVER BROMIDE GELATIN AND PROCESS OF MAKING SAME.—Albert Cobenzl, Bingen, Germany. A process for the manufacture of silver bromide gelatin, which consists in subjecting the solution of the emulsion in a hot state to the action of alcohol, then allowing it to ripen, then cooling it by agitation so that the silver bromide gelatin precipitates from the clear liquid which contains the soluble salts as a fine-grained sandy powder and then separating the same and washing.

718,313. BLAST FURNACE.—William C. Coffin, Pittsburg,



Pa. Outer wall construction for blast furnace comprising horizontal wall members loosely superposed and movable horizontally one upon the other, said outer wall having cooling plate openings, and cooling-plates for said openings.

718,318. PROCESS OF SOLIDIFYING VOLATILE HYDROCARBONS AND ALCOHOL AND PRODUCTS THEREOF.—August H. Cronemeyer, New York, N. Y. A product formed of 1 part sodium hydrate, 1½ parts water, 5 parts alcohol, 5 parts stearin, 2½ parts colophony, and 50 parts of an inflammable hydorcarbon.

718,335. PROCESS OF CEMENTATION.—Adolph Frank, Charlottenburg, Germany. A process which consists in reacting upon a carbide with an oxide of carbon, in the presence of the metal to be cemented and effecting the reaction at a temperature sufficiently high to separate the carbon.

718,361. APPARATUS FOR CARBURETING AIR.—Theodor H. J. Leckband, Des Moines, Ia., assignor of one-half to Mason City Gas & Fuel Company, Mason City, Ia. A water chamber having one portion of its bottom on a higher plane than the other portion, a carbureter located on the highest portion of said bottom, an oil and water separator on the lowest portion of the bottom, a pipe connecting the central portion of said separator with the lower portion of the carbureter and a pipe connecting the lower portion of said separator with the lower portion of the carbureter.

718,397. FILTER PRESS.—Wilhelm Sommer, Furth, Germany, assignor to Filter- & Brau- Technische Maschinen-Fabrik, Actien Gesellschaft, formerly L. A. Enzinger, Worms, Germany. A filter press comprising a stack of two alternating series of framed filter plates having central openings therein and other openings at the top and bottom sides thereof combining to form inlet and outlet passages respectively, the first said series being formed with gridbars across the central opening thereof and a groove about the periphery of said opening, and the second said series having ports communicating alternately with the inlet and outlet passages and a shoulder interlocking with said grooves about the central aperture thereof, other grooves formed in one of each pair of abutting faces around and between all three sets of openings, packing material lying in said last-mentioned grooves, and sheets of filtering material clamped between said interlocking grooves and shoulder.

718,433. HEATING FURNACE.—Fred H. Daniels, Worcester, Mass. A furnace of the continuous type, comprising intercommunicating sections one superposed upon the other, one of said sections being shorter than the other, and means for charging the shorter section with hot billets and the longer section with cold billets.

718,437. METHOD OF MANUFACTURING ELECTROLYTIC OR ELECTRIC LIGHT CARBONS.—Herbert H. Dow, Midland, Mich. The step in the manufacture of carbons, which consists in the depositing of vaporous binder upon the carbonaceous particles.

718,438. METHOD OF MANUFACTURING ELECTROLYTIC OR ELECTRIC LIGHT CARBONS.—Herbert H. Dow, Midland, Mich. The step in a method of manufacturing carbons, which consists in mixing carbonaceous material with an emulsion of a binder and a liquid.

718,476. MILL FOR ROLLING SEAMLESS TUBING.—John H. King and Edward M. Wolfe, Beaver Falls, Pa., assignors of one-third to George H. Blaxter, Pittsburg, Pa. In a rolling mill, the combination of two independent sets of roll spindles and rolls, the rolls and spindles of one set being arranged in staggered relation to the rolls and spindles of the other set, with correspondingly arranged housings, a driving element, and gearing connecting said driving element with the spindles of each set respectively, and necessitating the driving of said sets in opposite directions.

718,494. CRUCIBLE SHAKER.—William S. Mather, Newark, N. J. An improved crucible shaker, comprising a rotary shaft, a table having depending ears or bearings straddling said shaft and preventing lateral movement while permitting vertical movement, and a rotary cam or eccentric arranged beneath said table on said shaft and adapted to vertically reciprocate said table.

718,546. MANUFACTURE OF METAL RODS OR THE LIKE.—Frederick Tomlinson, Salford, England, assignor of one-half to the Broughton Copper Company, Limited, Salford, England. A method of making metal rods and the like which consists in forming holes in a metal ingot, and then reducing the ingot in diameter until the holes become elongated and closed and thus divide the intermediate portion of the rod thus formed into strands connecting undivided portions of the metal.

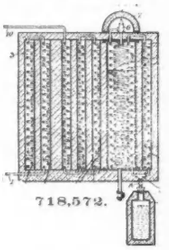
718,554. METHOD OF EXTRACTING ZINC.—William G. Waring, Tyrone, Pa. A process, consisting in leaching zinkiferous ores, residues, metallurgical products, or natural deposits, with a weakly-acidulated water, containing not to exceed 1.5 per cent of free sulphuric acid, or its equivalent of other mineral acid, precipitating the metals of the copper group by agitation with a soluble sulphide, and finally separating the zinc by means of hydrogen sulphide.

718,555. METHOD OF PRODUCING PURE WHITE PIGMENT.—William G. Waring, Tyrone, Pa. A method of producing a pure white pigment consisting of barium sulphate and zinc oxide, by precipitating a mixed solution of zinc sulphate and chloride with an emulsion composed of magnesium oxide suspended in a solution of barium chloride.

718,556. METHOD OF MAKING PURE HYDROGEN SULPHIDE FROM FURNACE GASES.—William G. Waring, Tyrone, Pa. A method of converting sulphur dioxide contained in furnace gases or in other admixture into pure hydrogen sulphide which consists in absorbing the sulphur dioxide in a strong solution of sodium sulphite, combining the sulphur dioxide so absorbed with barium, by means of reacting upon barium carbonate with the acid sodium sulphite so produced; storing the evolved pure carbon dioxide; reducing the barium sulphite thus produced to barium sulphide by means of calcination with coal, and finally causing the carbon dioxide stored as described to react upon the said barium sulphide, so as to produce hydrogen sulphide, with regeneration of the barium carbonate.

718,557. CENTRIFUGAL PUMP.—William Wenzel, Appleton, Wis. In combination with a pump casing provided with an annular chamber, a rotatable piston mounted in said casing and provided about its periphery with a series of spiral conveyers, and a series of radially-disposed blades carried by said piston and projecting radially outward beyond the edges of said conveyers into said annular chamber and being in working juxtaposition to the walls thereof.

718,572. APPARATUS FOR THE LIQUEFACTION OF AIR OR OTHER AERIFORM FLUIDS.—Celeste Joly, London, England, assignor of three-fourths to Edwin Joseph Richardson, Boydell Graves and Barnard Alfred Spaull, London, England. The combination in apparatus of ther-



mally insulated chambers, inlet coils of pipe with connections so as to form a continuous series contained in and extending through said insulated chambers, an inner thermally-insulated vessel, a coil of pipe arranged in said vessel and connected with said series of coils and opening within said vessel, a pressure-maintaining valve having its inlet side in communication with the interior of said vessel, a coil of pipe connected wth the outlet side of said valve and extending through said vessel, a three-way connection at end of last mentioned coil, a receptacle for the collection of the liquid, and a series of outlet coils of pipe extending through said insulated chambers for the outlet of the cold fluid which has passed through the valve and which has not been retained in the liquid form.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending December 18, 1902.

23,823 of 1901. MAGNETIC SEPARATOR.—A. E. Salwen, Sweden. A magnetic separator with movable magnets carrying magnetic material to cavities in a stationary separating room from which it is collected.

23,840 of 1901. TITANIC ACID RECOVERY.—C. H. Homan, Christiana, Norway. Recovering titanic acid by smelting titaniferous iron ores in an electric furnace, to get rid of the iron.

23,939 of 1901. TOUGHENING STEEL.—W. L. Frith, London. Heating steel articles in an atmosphere of mercury vapor under pressure in order to toughen them.

25,208 of 1901. ELECTRIC WELDING.—H. Bosshard, Ardennes, France. An improved electric welding apparatus for welding chains.

25,698 of 1901. AMALGAMATOR FEED.—Redruth Foundry Company, Redruth. Improved automatic feed for pan amalgamators.

26,647 of 1901. DISTILLING OIL SHALE.—N. M. Henderson, Broxburn. Improvements in the inventor's retorts for distilling oil shale.

1,244 of 1902. ROCK DRILL.—W. C. Stephens, Carn Brea. Improvements in buffers for the valves and main pistons of percussive rock drills.

4,688 of 1902. TUYERES.—W. J. Foster, Darlaston. Improved circulation of water in tuyeres of blast furnaces to prevent the water getting into the furnace when the tuyere burns out.

7,832 of 1902. PICKLING SHEETS.—F. B. Crossley, Wakefield. Adding waste iron to pickling liquors in order to bring the solution to higher strength and so reduce the cost of producing crystals by evaporation.

17,250 of 1902. ROCK DRILL.—W. Brady and W. C. Spencer, San Francisco, U. S. A. A rock drill actuated directly by the piston of a small gas engine.

19,433 of 1902. BORING TOOL.—W. Hoos and E. Bartsch, Ottweiler, Germany. A rotating boring tool, the cutters or teeth being interchangeable.

20,281 of 1902. SAFETY LAMP.—J. T. Beard and M. D. Mackie, Scranton, Pa., U. S. A. An improved gas detecting attachment for miners' safety lamps.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

PERSONAL.

Mr. H. F. Lefevre is at Salt Lake, Utah.

Mr. Wythe Denby, from Snettisham, Alaska, is in New York City.

Mr. Charles Catlett, of Staunton, Va., was in New York City last week.

Mr. Jas. W. Abbott is now in Denver, Colo., after a tour of the northwest.

Mr. E. E. Olcott, of New York City, has returned from a visit to Europe.

Mr. Rensselaer H. Toll is to be married at Mancos, Colo., on January 28, to Miss Bauer.

Mr. Victor M. Clement and Mr. Donald McVichie have left Salt Lake, Utah, for Mexico.

Mr. John Towers, of Portland, Ore., is in New York City after a journey to Alaska.

Mr. Lyman H. White succeeds Mr. Harry H. Lee as state commissioner of mines in Colorado.

Mr. Leo Von Rosenberg left New York City last week for California, where he will examine mines.

Dr. R. W. Raymond is reported to be enjoying his well-earned rest in Italy. The date of his return is not determined.

Mr. A. A. Blow, of Leadville and the Sheba Mine, has been in New York City for a few days, on his way to London.

Mr. Rees C. Vidler, the well-known mining man of Georgetown, Colo., has been looking at mining property in Gilpin County.

Mr. G. P. Goodier, manager of the Ore Verde Mining Company's property at Yankee, Colo., is making a business trip to the East.

Mr. Harry H. Lee has retired from the position of commissioner of mines in Colorado after 8 years of conscientious good work.

Mr. Frank Nicholson, consulting engineer to mines in the Joplin District of Missouri, was in New York City this week en route to Boston.

Mr. S. Herbert Williams is now in Korea, in charge of mining explorations which are being made in behalf of the British & Korean Corporation.

Mr. Albert F. Fuerst, member of the well-known chemical firm of Fuerst Brothers & Co., of New York City, recently returned from a trip to Cuba.

Mr. Hudson H. Nicholson, mining engineer, of Denver, Colo., has just returned from a trip of inspection of mining property in the Sumpter District, Ore.

Mr. Bernard MacDonald, formerly manager of the Le Roi Mine, at Rossland, is in New York City. Mr. MacDonald intends to reside at Spokane, Wash.

Mr. Philip Wiseman, of Los Angeles, Cal., is now in New York City. Mr. Wiseman was formerly with the Colorado Smelting Company at Butte, Mont.

Mr. Jas. Douglas, of the Copper Queen Mining Company, is in Egypt on a holiday tour, going over ground visited by him with his father 50 years ago.

Mr. Ralph Nichols, on his way from Kalgoorlie, West Australia, was a passenger on the overdue steamship *St. Louis*, which reached New York on January 17.

Mr. O. Bergstrom, who, as chief chemist, has been with the Colorado Smelter, at Butte, for 15 years, has tendered his resignation, to take effect on January 25.

Mr. W. Broderick Cloete, managing director of the Grand Central Mining Company, arrived recently at Minas Prietas, Sonora, Mexico, from his home in London.

Mr. C. T. Durell, of Lewistown, Mont., is now at his former home in Denver, Colo. He is manager of the Central Montana Mines Company, operating in Fergus County.

Mr. A. G. Larson, who has been superintendent of the Nickel Plate and Kootenay mines, at Rossland, B. C., is general superintendent of the Rossland-Kootenay Mining Company, at Rossland.

Prof. Robert H. Richards, of the Massachusetts Institute of Technology, will give some talks on ore dressing to the students of the Missouri School of Mines, Rolla, Mo., on January 22 and 23.

Mr. J. E. Moyer, who has been superintendent of Corrigan, McKinney & Company's blast furnace interests for some years at Cleveland, O., and at Scottdale and Charlotte, Pa., has resigned his position.

Mr. C. W. Baldwin, of Chicago, Ill., who is interested in the operations of the New National Tunnel Mining Company, in Gilpin County, Colo., has been a visitor at the property near Black Hawk.

Mr. David Young, mine foreman of the Nellie coke plant of Brown & Cochran, near Dawson, Pa., has resigned his position to accept the superintendency of the Revere plant of the W. J. Rainey Coke Company.

Mr. W. Llewellyn, of the Llewellyn Iron Works of Los Angeles, Cal., is in Topolobampo, Mex., to install a plant at the John R. Newberry Mine—six Standard concentrating tables and 2 Huntington mills, boilers, etc.

Mr. F. Harley Davis, of New York City, inventor of the Davis calyx drill, has been in Sydney, Cape Breton. From Nova Scotia Mr. Davis goes to California, and thence to Russia, to place artesian wells for the Russian Government.

Mr. Henry M. Whitney, of Boston, is in Cuba as the guest of Sir Wm. C. Van Horne. He will make a thorough inspection of the Cuba Railway Company, which extends from Havana to Santiago, and which was built by Sir William C. Van Horne.

Mr. F. B. Slocum, formerly with the Worthington branch of the International Steam Pump Company, at New York City, and one time associated with the Otis Elevator Company, has assumed the management of the New York offices of Joseph T. Ryerson & Son, Chicago.

Mr. E. P. Jennings, manager of the Coconino Company's copper properties at Ryan, Ariz., recently returned to Salt Lake, Utah, from the east. The new mill is turning out a satisfactory tonnage of fine copper, the first consignment of which he marketed while in the east.

Mr. Harry Lockman, constructing engineer for the S. Morgan Smith Company, of York, Pa., is in Montana, where he has just finished installing for his company 8 McCormick turbines in 4 units in series of two at the dam of the Missouri River Power Company at Canyon Ferry.

OBITUARY.

D. B. Lyman, for 20 years superintendent of mines on the Comstock Lode, Nev., when they were at the zenith of their productivity, died at Reno, Nev., recently, of pneumonia. He was 65 years old.

R. S. Lanyon, who died at East Dubuque, Ill., on January 8, of chronic anaemia, was born at Mineral Point, Wis., in 1858. Until within a few years he was purchasing agent for the S. H. Lanyon & Bros. smelters at Pittsburg, Kans. He owned a considerable interest in the Lanyon Company. Mr. Lanyon left a widow and four children.

Geo. H. Trumble, manager and president of the Yadkin Mining and Improvement Company, operating the Tom Dixon gold and copper mine in Yadkin County, N. C., was killed by the turning over of a hoisting engine at the mine on January 8. Mr. Trumble was born in Saratoga Springs, N. Y., 34 years ago. He lived for some time in Ft. Worth, Texas, and about 10 years ago began mining in Colorado, where he was president of the Colorado Gold Mining Company, the Leburta Mining Company, and others. He was also agent of the German-American Consolidated Gold Mining Company, of the same State, and was of the firm of Case & Trumble, with offices at 508 Herman Building, Milwaukee, Wis. He was considered a man of good judgment on mining properties and was highly respected by all who knew him.

Gen. Samuel Thomas, who died in New York City recently, was born at South Point, O., in 1840. After the Civil War he began manufacturing pig iron and railroad supplies at Zanesville, O. Later, when the Hocking Valley coal fields were opened, he became interested in mining and took an active part in bringing under the control of a single company the coal and iron properties of the Hocking Valley. In 1878 he became a member of a large contracting firm and was engaged in building railroads in Ohio, Indiana, Illinois, Tennessee, Alabama and Georgia. General Thomas, at the time of his death, was a director in the Alabama Consolidated Coal and Iron Company, the American Pig Iron Storage Warrant Company, the Pacific Steel Company, Plastic Material Metal Covering Company, and Shelby Iron Company, and president and director of the United States Cast Iron Pipe and Foundry Company.

James Oscar Nixon, who died recently in Philadelphia, of typhoid fever, was engineer and manager of the silent-chain department of the Link-Belt Engineering Company, of Philadelphia. Mr. Nixon was but 23 years old. He was a native of New Orleans and a graduate of Tulare University, class of '97. After getting his degree in mechanical engineering he took up post graduate work in sugar chemistry, occupying at the same time the position of chemist on a large plantation. After leaving the university he spent a year in Wilmington, Del., as the manager of one of the branches of a large foundry. Three years ago Mr. Nixon became connected with the Link-Belt Engineering Company, and was almost immediately assigned to testing and mechanical development work, in which line he showed marked talent. Later he was assigned to developing and introducing the Renold silent chain, which was first presented in this country a little over a year ago, and was described by Mr. Nixon in a paper presented before the American Society of Mechanical Engineers on "A Silent Chain Gear."

Herbert Poole, president of the Robert Poole & Son Company, of Baltimore, Md., who had been in failing health for a year, died at his residence in Baltimore, of pneumonia, on January 14. Mr. Poole was born in Ireland in 1818, and came to this country with his parents when a boy, settling in Baltimore. At an early age he entered the Winans locomotive shops and later was with the Lanvale & Savage Company. In 1843 he formed the firm of Poole & Ferguson, and rapidly acquired a reputation as a practical machinist and designer. The firm later became Poole & Hunt, and started a little shop at Woodberry, then a suburb of Baltimore. The plant now covers over 20 acres of ground and employs over 400 men. The company was reorganized under its present title in 1889. Among the larger engineering feats accomplished by the company were the erection of the dome of the National Capitol at Washington and the construction of the heavy iron castings and columns of the Treasury Building. During the Civil War the firm manufactured many cannon for the Federal Army. The Poole-Leffel turbine water-wheel was in part the idea of Mr. Poole, and of recent years his company has manufactured many of the great disappearing gun carriages and other coast-defense machinery for the United States Government. A huge sand wheel, with bucket attachments, standing 65 ft. high, for the Calumet & Hecla Company, was one of the recent products of the firm. In fact, the Poole shops, unlike most machine shops, never followed a beaten path, but were always ready for novel orders and were among the few shops in this country prepared to take work of any description.

Mr. Poole was a public-spirited citizen who enjoyed the goodwill of his employees. He left five daughters and a son.

SOCIETIES AND TECHNICAL SCHOOLS.

CALIFORNIA ACADEMY OF SCIENCES.—At the annual election of officers at San Francisco, W. Alvord was elected presdent, to succeed D. S. Jordan; A. Bull, vice-president; H. H. Behr, second vice-president; J. O'B. Gunn, corresponding secretary; J. W. Hobson, recording secretary; L. H. Foote, treasurer; L. Falkenau, librarian; L. M. Loomis, director of the museum; W. M. Pierson, J. F. Houghton, W. H. Crocker, C. E. Grunsky, E. J. Molera, G. C. Perkins, G. W. Dickie, trustees.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—At the annual election of officers at Pittsburg the new officers elected were: Chester B. Albree, president; James M. Camp, vice-president; Samuel Diescher, vice-president, two-year term. Directors, Prof. S. M. Kintner, two-year term, and Selwyn M. Taylor; Prof. Albert E. Frost, treasurer, and C. W. Ridinger, secretary. The membership committee reported an increase of 118 during the year, making a total of 588. Mr. Scott, in his address, urged action on the choice of a site for the technological school promised by Andrew Carnegie.

STEVENS INSTITUTE OF TECHNOLOGY.—A series of interesting events in connection with the formal inauguration of Alexander C. Humphreys as president will take place on February 4 and 5. On the evening of February 4 there will be held in the Carnegie Laboratory of Engineering a reception given by the alumni to President Humphreys. On February 5, at 2 o'clock, the inauguration ceremonies will be held in the Carnegie Laboratory. At 7 p. m. there will be a reception and dinner, tendered by the alumni, at Sherry's, New York City. Many distinguished guests are expected to be present at this dinner. Advance acceptances have already been received from the presidents or other representatives of many leading universities and technical institutions of the East.

LEHIGH UNIVERSITY.—The Register, just issued, shows the attendance of 581 students, from 27 states and 6 foreign countries. There are 52 in the teaching staff. Twelve courses of instruction are offered: the Classical Course, the Latin-Scientific Course, courses in Civil, Mechanical, Metallurgical, Mining, Electrical and Chemical Engineering, Analytical Chemistry, Geology, Physics and Electrometallurgy. Fifty-seven students take the course in Mining Engineering and 13 the course in Metallurgical Engineering. The following prize Scholarships will be open to competition in June: Two in the Classical Course of $150 and $100 each, and one in the Latin-Scientific Course of $125 annually, in addition to free tuition. Provision is made for worthy and needy students whereby they may postpone payment of tuition until after graduation. A new 4-story building 186 by 70 ft. for the departments of mechanical engineering, mining engineering and geology is in process of construction.

WESTERN SOCIETY OF ENGINEERS.—At the recent annual meeting in Chicago announcement was made of the election of officers for the coming year, as follows: President, R. Modjeski, Chicago; first vice-president, H. W. Parker, Chicago; second vice-president, F. E. Turneure, Madison, Wis.; treasurer, Andrews Allen, Chicago; trustees, C. W. Hotchkiss, J. W. Alvord, B. E. Grant.

President Finley delivered an address summarizing the recent growth and present condition of the society, and transferred his authority to President-elect Modjeski. Among the other speakers at the annual dinner were Judge Kohlsaat, who took for his theme "Working to a Plan"; Prof. Geo. P. Howland, of the University of Chicago, on the "New Education"; Professor Baker, of the University of Illinois, on the "Conditions Necessary for Industrial Progress"; Gen. Wm. Sooy Smith, who gave some observations upon a recent trip to the Orient, and Capt. Robert W. Hunt, who spoke of the "Conclusion of the Whole Matter."

PUBLISHERS' ANNOUNCEMENT.

The editorial staff of the *Pacific Coast Miner* has been strengthened by the addition of Mr. Louis Janin, Jr., who will hereafter devote his entire time to editorial work. Mr. Janin is well known as a mining engineer of wide experience and especially as an expert in the cyanide process. The issue of the *Pacific Coast Miner* for January 24 will be the first Monthly State Number and will have 40 pages, including a general illustrated review of the mining interests of the State of Nevada. In addition to the general review, Mr. Janin contributes a special article on "The Results of an Examination of the Ores of the Chainman Mine, near Ely, Nevada," where a very interesting problem was presented to the metallurgists. Mr. H. A. Titcomb contributes an article on "The Camp Bird Mine in Colorado," while Mr. Thomas Price writes on "Early Copper Mining in California." Another article describes the applications of electrical power at the mines in Shasta County, Cal. On the editorial pages there will be found articles on such timely topics as "Mining and Milling Costs in California," "The Non-Recognition of Values," the "Proposed State Mining Bureau in Nevada," and "Mine Proprietors' Reports of Stores." In addition to this there will be the usual record of mining news in California and other States on the Pacific coast and in the Rocky Mountains. This number will also contain a large number of new advertisements from prominent firms and companies on the Coast.

INDUSTRIAL NOTES.

The J. H. Montgomery Machinery Company, of Denver, Colo., has taken a contract for a wire rope tramway, to be shipped to Montezuma, Mexico.

The Ingersoll-Sergeant Drill Company, of New York City, is contracting for the equipment of its new shops at Phillipsburg, N. J., and has been receiving bids on the cranes, of which there will be 12, ranging up to 20 tons capacity each.

The Halladie-Painter Tramway Company, of San Francisco, Cal., successor to the California Wire Works of San Francisco, recently installed a 2,500-ft. tramway on the property of the Eastern Oregon Mining and Milling Company, of Bourn, Ore., that has a capacity of 100 tons per day.

The S. H. Supply Company, of Denver, Colo., has recently purchased the compressor and boiler plant of the Portland Gold Mining Company, Victor, to make room for a larger outfit, and also dismantled 2 electric light plants at Manitou, Colo., which it now has in the warehouse in Denver.

The American Spiral Pipe Works, of Chicago, Ill., has recently secured orders for a mile of 20-in. pipe for shipment to Porto Rico for irrigation purposes. An order has also been received for half a mile of 24-in. pipe for shipment to South Africa. A shipment of 16-in. pipe is pending to Brazil.

The M. Garland Company, of Bay City, Mich., manufacturing sawmill machinery, states that the new year has started with business good. The firm has shipped a band mill carriage, equipped with improved set works and drag offset complete, also a 20-ft. Garland lumber trimmer, to Mark Dickinson, Tower, Mich.

The Allis-Chalmers Company, of Chicago, Ill., has taken an order for a steam hoisting equipment for shipment to mines in Finland. The outfit will be manufactured at the Fraser & Chalmers' shops of the company, at Chicago. Duplex Riedler pumping equipments have also been recently ordered for Alaskan and Mexican mines.

The Webster, Camp & Lane Company, which has erected an immense plant at South Akron, O., for the manufacture of hoisting and conveying machinery, will retain the old plant at Akron, and add a new department for the manufacture of ore and coal unloading buckets. The company now employs 600 men in the two plants.

Messrs. Adam Cook's Sons, of 313 West Street, New York City, sole manufacturers of Albany grease, will send their representative, J. Hernandez, on a trip through the entire South in February. Mr. Hernandez will visit industrial plants and prove the correctness of the company's assertion that Albany grease will give satisfaction in any climate.

The Quaker Cement Company, through T. P. Flinn, of 26 Broadway, New York City, is in the market for 4,000 h.p. of tandem or cross-compound engines. The units should range from 400 to 750 h.p. and prompt delivery is desired, even though purchases of second-hand engines are necessary. The Northampton Portland Cement Company controls the new concern.

The Robinson Clay Product Company, of Akron, O., announces that it has acquired the Robinson-Merrill Pottery Company, the Robinson Bros. & Company, the Crown Fire Clay Company, the Royal Sewer Pipe and Fire Brick Company, the Lock Haven Sewer Pipe Company, and the Canton and Malvern Fire Brick Paving Company. The management will remain unchanged.

The Burt Manufacturing Company, of Akron, O., reports that the Pittsburg Reduction Company has placed an order with it for a 90-gallon oil filter, also an 18-in. exhaust head, to be used in the new works at East St. Louis, Ill. An important shipment of oil filters and exhaust heads was recently made by the Burt Manufacturing Company, of Akron, O., to its agency at London, Eng. Other export orders went to Sweden, Japan and Argentine Republic.

The Denver Engineering Works, of Denver, Colo., reports recent sales of a number of Box electric drills, a large capacity electric hoist to the Utah Consolidated Mining Company, at Virginia City, Nev.; an electric hoist to the Contractors' Fuel Company, of Denver; a 20 h.p. electric hoist to the International Engineering Company, Parral, Mex.; a 12 by 16 steam hoist to the Utah Fuel Company, and a 135 h.p. electric hoist to the Northern Pacific Railroad for Roslyn, Wash.

The Pittsburg Gage and Supply Company, of Pittsburg, Pa., is equipping two 3,000-h.p. Allis engines of the Pittsburg Steel Company, Monessen, Pa., plant with the White Star continuous oiling systems. Other contracts are the equipping of 3 400-h.p. engines for the Clairton Steel Company, Clairton, Pa., and 6 500-h.p. engines in the electric light and power plant of Union Depot, Pittsburg, Pa., for the Pennsylvania Railroad Company, besides a system for the Amherst Gas Company, Amherst, Mass.

The Equitable Building, Boston, Mass., which was partially destroyed by fire on January 9, will be entirely rewired by Sargent, Conant & Company, of that city, who had a crew of men at work making temporary connections within 20 minutes after the fire was under control. As an example of modern commercial methods it may be noted that the Equitable Company, whose old offices were entirely gutted, was transacting business in new quarters with a complete office equipment, telephone service, etc., in less than 24 hours after the fire was extinguished.

Wellesley College is to have, through the generosity of John D. Rockefeller, an entirely new power plant. Apparatus will be installed for heating all the buildings on the college grounds, which extend over several acres, and the grounds will be lighted by electricity. Electric motors also will be used for operating elevators and blowers for ventilation purposes. Mr. Rockefeller has recently purchased from the Westinghouse Electric and Manufacturing Company, for this plant, 2 alternating-current, engine-type, two-phase alternators, separately excited, one of 150 kw., and one of 75 kw., also a 5 panel switchboard.

The Ottumwa Box Car Loader Company, of Ottumwa, Ia., says the Ottumwa box car loader for loading coal at docks, or other places where it is desired to move the machine quickly from one chute or pocket to another, is in daily operation at the Northwestern Fuel Company's dock No. 1, West Superior, Wis. Inquiries for this class of loaders are being received by the company in great numbers. The sale of the Ottumwa loader of the stationary pattern was very heavy during 1902, and the company now reports that it has installed altogether about 125 machines. The necessity for mines being equipped for properly loading box cars seems to be more generally recognized, and the probabilities are that 1903 will be a banner year for this company's business.

In consequence of the great and constantly increasing demand for the instruments of precision manufactured by Messrs. C. L. Berger & Sons, their old quarters, where 31 years ago the business was founded by their senior member, C. L. Berger, could no longer be made to fit the purpose, and they have been compelled to build a new factory with enlarged facilities. After January 20 they will therefore be located at the factory, main office and showrooms, at No. 37 William Street, Boston, Mass., where personal interviews may be had and where all letters and communications should be addressed. Customers and friends will find a visit to the new factory interesting, as it is fitted with the most modern machinery and auxiliary apparatus devised for the manufacture of precise engineering, surveying and astronomical instruments. The firm will keep a large stock of engineering instruments of all kinds, leveling rods, tapes, etc., always on hand.

At the adjourned meeting of the representatives of the Chicago Pneumatic Tool Company, in Chicago, Ill., on January 12, 13 and 14, all the company's representatives in the United States and Canada were present. President J. W. Duntley gave a banquet at the Union League Club, it being the second annual event. A beautiful loving cup was presented to President Duntley by the sales department. Mr. W. O. Duntley, vice-president, was presented with a very handsome gold match case set with diamonds. Messrs. J. W. and W. O. Duntley each made a speech of acceptance in which they thanked the representatives for the hearty support given and complimented them on the good showing made in 1902, the company having doubled the business of the previous year. Speeches were also made by the representatives, each giving a brief account of his experiences in the past year. Judge Steere made the closing speech, he touching on the success of the Messrs. Duntley in bringing the Chicago Pneumatic Tool Company up from a business in which they constituted the entire working force to the prominent place it now occupies. The exhibit rooms of the company were visited, where demonstrations were made of new tools which are being brought out and the new improvements which have been made on other machines. The company expects that the business of 1903 will at least show an increase of 50 per cent over 1902.

The directors of the Stanley Electric Manufacturing Company at a meeting on January 10 passed a resolution, providing that the capital stock of the company be increased from $3,000,000 to $10,000,000 and that the stockholders meet on February 11 to approve this action of the Board. Plans for this great increase of facilities have been under way for some time, to the end of placing the company on a basis to compete favorably with either of the other two great electrical manufacturers, the General Electric and the Westinghouse companies. Rumors have also been current ever since the acquirement by Wm. C. Whitney and his associates of an interest in Stanley stock to the effect that negotiations were under way for the sale of control of the company to the General Electric Company. The authoritative statement is made that these rumors have been founded on a misunderstanding. The Stanley Company recently secured an order from the New York Edison Company aggregating over $500,000 for dynamos and other electrical apparatus, some of which is to be the largest of its kind ever constructed. This indication of the company's invading the field of heavy work is now amply verified. Funds will be provided by this increase of capital for certain important developments which the engineers of the company have been planning for some time. Among these developments is a new system of operating for heavy long distance electric railways.

TRADE CATALOGUES.

The H. W. Johns-Manville Company, of New York City, is sending out printed matter calling attention to the merits of the Manville extinguisher, a dry powder device for putting out fires. Among the merits claimed for it are that it is simple, inexpensive, light, non-poisonous and cannot deteriorate.

The American Tool Works Company, of Cincinnati, O., in an attractive pamphlet of 8 pages, describes the American lathe, which it terms the "Lathe without a Peer." The 18-in. lathe is stated to have a range of 44 changes of thread and of 44 changes of feed instantly obtainable without removing a single gear, while the entire series of threads or feeds can be obtained ready to work in 30 seconds. The company also states that the lathe represents the culmination of 18 years' lathe building, is of entirely new design throughout and its principal parts and improved mechanism are covered by patents.

A pamphlet of 46 pages containing some striking views of mountain scenery is issued by the A. Leschen & Sons Rope Company, St. Louis, Mo. It is entitled "Wire Rope Tramways," and describes the patent automatic system, the friction grip system, the single-line tramway, the two-bucket system, and the single-carrier line aerial tramways, owned and manufactured by the Leschen Company. The company's automatic system is of the double-rope type, having 2 stationary cables, on which the buckets or carriers move and an endless traction rope. The cables are supported on towers usually placed 200 to 250 ft. apart, with specially designed saddles giving a long bearing. The traction rope is supported on metalline bushed guide sheaves, which require no oiling. The sheave liners are very thick, with a large wearing surface, and can be easily replaced, thus reducing the cost of maintenance. The buckets are attached and detached automatically to or from clips, these clips being fastened to the running rope by wrought drop-forged bands, having the lay of the rope forged in them, so that slipping is impossible. The buckets can be modified to suit requirements. The

standard buckets have a capacity of 6½ cu. ft. each, and are so hung that it is impossible for them to tip over of themselves whether empty or loaded, hence no locking is required to keep the buckets straight. By means of an overhanging guide rod placed at a desired point, the clip-frame is moved upward on the guide-iron, pulling back the forward of two movable dogs on the clip bracket. The clip is thus released, passes out of the bracket and the bucket is free. In attaching a bucket to a clip, the bucket is accelerated to the full speed of the running rope, the clip is then locked in the clip-frame and the bucket passes along the line.

GENERAL MINING NEWS.

Mineral Oil Exports.—In 1902 the United States made the following exports, quantities being in gallons:

	1901.	1902.	Changes.
Crude	126,925,717	144,065,436	I. 17,139,719
Naphthas	20,715,971	18,530,970	D. 2,185,001
Illuminating	817,375,944	765,911,987	D. 51,463,957
Lubric. & Paraffin.	73,031,177	79,933,109	I. 6,902,032
Residium	26,980,616	38,236,974	I. 11,256,358
Total gals.	1,065,029,425	1,046,678,476	D. 18,350,949

The decrease in 1902 is equal to 1.7 per cent, owing chiefly to the smaller demand for illuminating oil in Great Britain and Japan. Shipments to Chinese territory show an increase and an improvement is also noted in the African trade. Germany has taken direct somewhat less than 1901, but the movement to Holland has appreciated greatly. South American trade, outside of Brazil, is not extensive, though it shows an increase in some countries. British North America has proved a better buyer. There has also been an increase in the shipments to the Philippine Islands. It is interesting to add that the bulk of the crude oil exported in 1902 went to France, where it is used principally for fuel.

ARIZONA.

GILA COUNTY.

(From Our Special Correspondent.)

Old Dominion.—The results of the effort to lower the water in this mine at Globe, are reported unsatisfactory. Smelting has been resumed with one furnace.

GRAHAM COUNTY.

Arizona Copper Company.—The production of copper at the works at Clifton in December was equivalent to 1,111 tons of 2,000 lbs. each.

PIMA COUNTY.

(From Our Special Correspondent.)

Mammoth-Collins.—The title to these gold properties, together with the 70-stamp mill, has been sold to Frank H. Fletcher, of Detroit, Mich.. and operations are to be resumed at once.

SANTA CRUZ COUNTY.

(From Our Special Correspondent.)

Nogales Copper Company.—This company, at Nogales, has orders for 2 100-ton furnaces for its mines at Buena Vista and Pena Blanca.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Central Eureka.—In this mine, near Sutter Creek, W. R. Thomas, superintendent, a rich pocket was found recently.

Kennedy.—Work on the mill of this mine at Jackson, J. F. Parks, superintendent, is going on slowly, skilled labor being hard to get.

Moore.—Litigation over this mine, near Jackson, has been ended by placing on record the deed of the referee in the partition suits in favor of W. A. Nevills. Mining may start any time now.

Shenandoah.—In this mine, at Plymouth, S. K. Thornton, superintendent, the shaft is down 1,000 ft., and is reported to be in vein matter.

South Eureka.—At this mine, Sutter Creek, John Truscott, superintendent, the 20-stamp mill is idle, pending development on the 2,300 ft. level.

Whitmore.—This mine, near Volcano, is being worked. The 4-stamp mill formerly at the Defender Mine is to be used at the Whitmore.

BUTTE COUNTY.

(From Our Special Correspondent.)

Resumption.—This mine, near Hurleton, has been bonded to W. P. Burke, of Santa Rosa, who will make certain tests preparatory to building a mill. He has also bonded the Century and Resumption Extension. R. F. Platt, of Oakland, is interested with Mr. Burke.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Independence.—At this gravel mine, near Angels, so much water has been encountered that pumps will have to be put in.

Fanny-Marie.—In this mine, at Glencoe, F. A. Courtmarsh, superintendent, the sump at the 400 is completed. The new 10-stamp mill runs satisfactorily. At the Blue Jay the company expects to reach the vein by April, when a 40-stamp mill will be required.

Shepard Gravel.—This mine, near El Dorado, will shortly be operated on an extensive scale. The mine is under bond to the men interested in the Gray Wing Mine, near Folsom.

EL DORADO COUNTY.

(From Our Special Correspondent.)

Josephine.—In this mine, at Georgetown, J. M. Nougues, Jr., superintendent, it is reported that a strike of ore prospecting well has been made in the cross-cut in No. 5 tunnel.

HUMBOLDT COUNTY.

(From Our Special Correspondent.)

Orleans Bar.—At this place, on the Klamath River, the Orleans Bar Gold Mining Company, H. DeC. Richards, general manager, and Fred T. Hale, superintendent, is moving large quantities of gravel with 2 giants piping night and day. An abundant supply of water is expected during the season.

Prospect Hill.—At this claim, Orleans Bar, owned by W. H. Bowersox, Doney & Little, a small quartz mill is ready for prospecting.

KERN COUNTY.

(From Our Special Correspondent.)

Bagdad.—At these mines, near Ludlow, Superintendent Stagg is working 60 men on the Bagdad and 15 on the Gentry Mine.

Red Rock Gravel Mining Company.—This company, composed of Randsburg men, G. W. and C. Lloyd, W. D. Baney, C. E. Van Meter and W. A. McGinn, is going to work the old Red Rock District placers near Randsburg, formerly worked as dry washing diggings. A gasoline engine is to pump water to the canyon.

United States Gold Mining and Milling Company.—This Los Angeles company has bought the Burton property near Vaughn and intends to build a 20-stamp mill. There is already a 4-stamp mill at the mine. The company is running a 2,000-ft. tunnel to cut the principal lode, the Pine Tree.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

Diana.—In Diana No. 5, at Coultervilee, H. Soderburg, superintendent, the vein in the incline shaft is from 3 to 4 ft. wide, with a good grade of ore. Development work continues.

Mariposa Commercial and Mining Company.—The electric motor for the Princeton Mill at Mount Bullion, owned by this company, C. C. Derby, manager, is in place. It will force the water from the creek to the mill. A boiler and engine have been provided for the Garratt triple-action pump, in case of accident to the electric motor or line.

NEVADA COUNTY.

(From Our Special Correspondent.)

Nevada County Ore Production.—The *Tidings-Telegraph* estimates the output of Grass Valley in 1902 at $1,200,000. The ore crushed is estimated at 83,000 tons. In developing properties 275,000 ft. of work has been done at a cost of $225,000, and $520,000 has been paid out in wages. On this showing it seems that a little over three-fifths of the money taken out was spent in the camp itself.

Grear-Ironclad Mining Company.—This company has acquired the Ironclad Mine, at Rough and Ready. The officers of the company are: H. M. Black, president; S. J. McConnell, secretary and manager; Geo. C. Hay, superintendent.

Union Blue Gravel.—In this mine, at North Bloomfield, A. D. Gassaway, superintendent, the tunnel is now in 5,100 ft. At the cross cut at 4,750 ft. gravel is being taken out on which a 10-stamp mill is running night and day. Forty men are employed.

PLACER COUNTY.

(From Our Special Correspondent.)

Alameda Gold Mining Company.—This company, near Westville, has 10 stamps running constantly.

California Mining Company.—This company, at Shady Run, has 15 men taking out gravel.

Golden West Consolidated Mining Company.—The tunnel at the Big Hill Mine, Canada Hill, will be completed by April. Fred Schulze is superintendent.

Hidden Treasure Mining Company.—This company at Forest Hill, H. D. Power, president, and C. D. Akers, superintendent, has 160 men employed. The tunnel is now in 10,250 ft., and 2,500 cars of gravel weekly are hauled out by the electric locomotive.

Lone Buck and Buzzard Hill.—These mines, at Pilot Hill, have been sold by C. Farmer to Manuel Coster.

Three Stars.—At this mine, at Ophir, 60 men are busy.

SAN BENITO COUNTY.

(From Our Special Correspondent.)

Cerro Bonito.—At this quicksilver property, near Panoche, work is to start on an extensive scale with about 40 men.

SAN DIEGO COUNTY.

(From Our Special Correspondent.)

California King Mining Company.—The San Diego *Union* reports that the cyanide plant on the Colorado River, owned by this company, has started operations. It has a capacity of 1,000 tons daily.

Julian Smelter.—Material for the new smelter at Julian is being hauled in, as well as wood for fuel.

SHASTA COUNTY.

(From Our Special Correspondent.)

Balaklala.—The deal for the purchase of these copper mines is reported closed in Salt Lake. P. L. Kimberly, of Pittsburg, Pa., the principal stockholder in the Western Exploration Company, made the payment of the balance on the $650,000 of the total. The mines lie north of Keswick and at one time were under bond to the Mountain Copper Company.

Blue Jay.—A rich strike has been made in this mine, 4 miles north of Redding, owned by Sutton & Leaming. The ore carries copper and gold.

Crown Deep Mining Company.—This company, which owns the Summit, Gold Leaf, North End, Gold, Bronze and Lola claims, 4 miles north of Redding, is to build an extensive cyanide plant. The plant will do custom work as well as treat ore from the mines owned by the company erecting it.

Keswick Crude Oil Company.—The oil claims of this company were "jumped" on New Year's morning, no work having been done on them in 1902.

Mount Shasta Gold Mines Corporation.—F. E. Ware, manager of this company, states to a local paper that the merger of the Bully Hill properties with those of his company is not off, as reported.

SIERRA COUNTY.

(From Our Special Correspondent.)

M. Shakleford has bought an interest in the claim of John Taylor, George and Horace Morse and W. H. Corbiere on the North Fork.

Dewey Mining Company.—This company, opening a gravel mine in this county, has its principal place of business at Grass Valley. The following officers have been elected: I. Haas, president; Carl P. Jones, secretary; C. E. Clinch, treasurer; J. S. Goodwin, H. C. Zapf, directors.

Rose and Harold.—Guthrie, Oklahoma, men have taken hold of these two mines at Poker Flat and formed a company to develop them.

TRINITY COUNTY.

(From Our Special Correspondent.)

Keno.—Mr. Manning, of San Francisco, has bonded this, the Surprise and Five Pines claims near Bragdon. Fifteen men are doing development and a 10-stamp mill will be erected in the spring.

Lappin.—This mine, at Deadwood, has closed for the winter. The last crushing of 150 tons yielded $33 per ton.

Morton.—Machinery is being hauled to this mine, near Trinity Center. A quartz mill to be run by electric power is to be put in and the ditch for water power is being dug.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

Altadena.—This mine and the Kearsarge No. 2 have been sold by the Altadena Mining Company to Wm. L. Holmes, of Detroit, Mich., for a gross sum of $35,720.

App.—In this mine, Capt. W. A. Nevills, manager, a rich strike has been made on the 1,100 ft. level. The 60-stamp mill is running on ore from this strike.

Confidence.—The new cyanide plant at Confidence has started. Tailings direct from the mill will be treated. The capacity is 100 tons daily.

Hardtack.—This mine, at Carters, which has been closed some months, is in difficulty owing to disagreements among owners, and some liens have been filed.

Jumper.—In this mine, at Stent, Mark B. Kerr, superintendent, better ventilation is being provided. The new mine timbers are dipped in a preservative before being put in. The 60-stamp mill is running steadily, using electric power.

Lost Fox.—Work is to be resumed. The shaft is down 200 ft. and must be sunk to keep the mill running. Good machinery has been installed.

Mazeppa.—The new mill for this mine is almost completed. There are 10 stamps, with places for 10 more.

Mount Hood.—At this mine 5 stamps will shortly be added to the 5 already working.

Mount Jefferson.—At this mine, near Groveland, owned by the Meighan Mining Company at Groveland, J. M. Meighan, superintendent, a gasoline engine and pump are in place. The mill is running night and day.

Mountain Belle.—This mine, near Soulsbyville, owned by Thomas Soulsby, is being pumped out under direction of Wm. Sharwood. The mine is an old one, but has been little worked.

Mountain King.—This mine, near Sonora, is being developed by a New York company. Dr. Bowers is superintending the installation of the machinery.

Nonpareil.—A. P. Dron has men at work extracting ore, which is low grade, for a mill test.

Providence.—A good shoot of ore is being stoped on the 300 level of this mine at Carters. The ledge has not yet been found on the 1,000 ft. level.

Rawhide.—In this mine, at Jamestown, W. H. Turner, superintendent, the main shaft has been unwatered and retimbered to the 1,500 ft. level. The 40-stamp mill is busy. The chlorination works will soon start up, with oil for furnace fuel instead of wood.

Rawhide Extension.—At this mine, near Jamestown, 5 stamps are running and 5 more are to be added. An assay office has recently been erected. J. A. Burkhardt is superintendent.

Worcester.—At this mine, at the head of Long Gulch, Carters, Los Angeles men have pumped out the water to make examination. The placers of Long Gulch, very rich in early days, are supposed to have come largely from this ledge. The mine itself paid well many years ago, but has long been idle.

COLORADO.

CHAFFEE COUNTY.

Gold Hill.—This gold property and 3 claims adjoining known as the Fourth of July Group, on Granite Creek, 3 miles above Granite, have been taken over by the Baltimore Mines Company. The officers of the company are: W. Wade, Granite, president; J. W. Wooley, Granite, vice-president; Chester C. Robbins, Sumpter, secretary and treasurer; W. W. Robbins, general manager. The directors are: W. Wade, Sol Camp, W. W. and C. C. Robbins, J. W. Wooley and O. C. Wright.

CUSTER COUNTY.

Bull Domingo.—This mine, 3 miles north of Silver Cliff, is owned by the Phenix Lead Company, but is reported to be under lease to the Neptune Mining Company. The shaft is down 1,000 ft. Little work is now being done at the mine.

Custer Gold Mining Company.—This company, in which Toledo, O., men are interested, owns the Toledo Mine, near Querida. The shaft has been sunk 115 ft, and may be sunk to 300 ft. G. R. Raymond is manager.

Valley.—This mine, 3 miles north of Westcliffe, is owned by the Valley Mining Company, in which Iowa City men are stockholders. The shaft is down 500 ft. and may be sunk to 1,000 ft. H. W. Barry is superintendent.

Wolcott Gold Mining Company.—This company is developing the P. & O. Mine, near Querida. The shaft is down 500 ft. The property is an old producer. James Fitzgerald is superintendent.

GILPIN COUNTY.

(From Our Special Correspondent.)

Butler Consolidated Mines Company.—A recent shipment of iron gave values of 2.03 oz. gold, 11.05 oz. silver, and 4.2 per cent copper; the ores coming from the 300 west drift. The company has decided to sink the shaft. Boston parties are interested, with G. W. Mabee, Jr., in charge.

Mingo Gold Mining Company.—A good strike is reported in the 300 west level, the ore showing a 12-in. streak of gray copper and lead, said to carry very fair values, alongside which are about 2 ft. of free milling ore. A. B. Drake, Central City, is in charge.

New National Mining Company.—Arrangements are being made to resume work on the Horseshoe lode, in Enterprise District, and a 16 h.p. gasoline hoist of Fairbanks, Morse & Co. make has been ordered. The shaft is down 185 ft. and both drifting and sinking will be carried on. Chicago parties are interested, with John Brohl, of Central City, as superintendent.

Old Town Consolidated Mining Company.—A set of 4 leasers working but 4 men in all cleaned up during the past 2 months $2,550. They shipped 47 tons of concentrates and 16 tons of smelting ores, netting an average of $43 per ton. G. K. Kimball, Jr., Idaho Springs, is manager.

Powers Mining and Milling Company.—In sinking the shaft the mineral streak shows about 14 in. of almost solid ore, enargite or gray copper. The shaft is down 225 ft. The first class ores run a little over $60 per ton and carry as high as 23 per cent in copper. The lower levels show fair sized ore body. J. B. Storey, Nevadaville, is interested in the management.

LAKE COUNTY—LEADVILLE.

Bangkok-Cora Belle Mining Company.—A circular issued by the president of this company states that in March, 1902, a lease of the properties of the company was made to Messrs. Newell and Page, of Leadville, who secured leases upon adjoining properties and organized the Fryer Hill Mines Company, procuring capital mainly from the East to undertake the serious task of unwatering the extensive underground workings. The mines have been successfully unwatered and the work of opening up the underground workings, clearing the levels of waste, timbering, etc., has proceeded up to the present. Connections with the workings, levels and drifts have been made from the El Paso shaft and mining has commenced. The present production of ores from Bangkok-Cora Belle ground is 12 to 15 tons per day. No smelter settlements have been received, but it is understood that the ores are of good grade for that locality. It is reasonable to expect that within 12 to 15 months these new bodies of ore which are believed to exist will be reached and that from that date the production will be continuous and in very considerable amounts. The company has no indebtedness and taxes have been kept fully paid up. During the past 5 years no salaries have been paid to officers and no office or other expenses allowed, except such nominal amounts as were necessary for holding stockholders' meetings. It is desirable that the secretary, James H. Crandell, Box 1,411, Denver, Colo., be furnished with the present address of each stockholder.

(From Our Special Correspondent.)

Ballard Mill.—The new cyanide mill to handle the low grade siliceous ores is completed. It will treat about 50 tons daily. Mr. Dale Owen is in charge. The capacity of the plant will be increased if it proves a success.

Big Evans Mining Company.—This company has its shaft at the far north end of the Leadville Basin down 320 ft. in virgin ground.

Chrysolyte.—J. C. Hume & Company have just secured a lease on the main shaft and operations begin at once. They have low grade iron ore.

Crown Point.—After a long idleness a leasing company headed by Maurice Starne and J. D. Murphy, is resuming work. They have large bodies of low grade sulphides in sight and shipments will be heavy.

Iron Silver Mining Company.—Two hundred to 250 tons daily of iron ore is coming from the Moyer workings, while the new shaft, 1,700 ft. north of the old Moyer shaft, is going down rapidly. There are some enormous shoots showing in the Moyer. One of the shoots, a fine grade copper sulphide carrying 30 to 60 ozs. silver and 4 to 5 per cent copper, has been opened for 300 ft. north and south and proven to a thickness of 50 ft. and on an average 200 ft. wide. The new shaft at this point is down over 325 ft., and will strike the second level of the Moyer at 615 ft. It will be completed early in April and will be the means of developing a section of ground 450 by 1,000 ft. The net value of this ore is about $5 a ton and the cost of handling is about $2.50 a ton. An immense tonnage of dump material is being shipped by the United States Zinc Company.

Louisville.—This property and the Ulster-Newton are being actively developed and shipments will be regular from the low grade ore bodies at the 600 ft. level. It is probable that the Louisville shaft will be sunk to open the sulphide contacts at 1,000 ft.

Matchless.—This old Fryer Hill producer that has been idle a long time, has been leased to D. D. Sullivan & Co., who are taking out 50 tons daily fair grade iron ore.

Penn Mining Company.—There is talk of some new development work on the Penn properties, where large bodies of low-grade ore are exposed. Twenty-five tons daily of this siliceous material are now being shipped.

Progressive Mining Company.—In driving the west drift on the new strike in the Cady shaft small bunches and streaks of minium have been met assaying as high as 85 per cent lead and very rich in silver.

Reno Mining Company.—This property, on Printer Boy Hill, in its new workings at 100 ft. depth has cut strong copper mineralization.

Resurrection Mining Company.—The mill is completed and the tables are being put in. The company has immense bodies of low grade ore, but the first ore to be treated will be taken from the dump to see just what the new mill can accomplish.

Small Hopes.—Sulphide tonnage has increased and a very fine zinc sulphide is being shipped to European ports, about 125 tons a day being handled.

Tarshish Mining Company.—This company on its Carbonate Hill territory is following some rich streaks of carbonate ore.

Valley Leasing and Mining Company.—J. W. Deane, who is pushing work for eastern owners, states that the new shaft has passed through good ore, of which over 80 tons were taken out.

Virginius.—R. B. Estey has a lease on this property, which extends across Fryer Hill to Progressive territory. He will sink a new shaft to contact at once.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Nellie and Ella.—These mines, in Bear Creek, 1½ miles southwest of Telluride, are producing gold-bearing ore, yielding very profitable returns. Until recently the tonnage was sufficient to keep 35 stamps busy at the San Miguel Consolidated 120-stamp mill, in Bear Creek, but now only 20 are dropping. The properties were formerly owned by the North American Exploration Company, composed principally of French capitalists. The vein carries from 3 to 6 ft. of milling material. The mines are connected with the mill by an aerial tramway 1¼ miles long. Cooper Anderson, of Telluride, is in charge.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Copper Mountain Gold Mining Company.—The question of reorganizing the company will be taken up at once. The directors elected are: M. F. Stark, president; F. M. Keeth, vice-president; H. C. Shimp, secretary; and G. A. Cockburn, treasurer. At present there is considerable activity on Copper Mountain, where the property of this company is situated.

Glenn vs. Isabella.—This damage suit, in which the plaintiffs allege that the defendants prevented them from taking out ore that belonged to them, appears to be developing into an apex suit. One of the questions at issue is what veins belonged to the ground leased. The suit is for $35,000 and dates back to 1897. At present the plaintiffs have all their evidence in and the defendants are ready to proceed.

Golden Cycle Mining Company.—The annual meeting of the stockholders will be held January 29 in Denver. The financial statement for November is as follows:

Receipts.		Disbursements.	
Ore sales	$48,984	Operating expenses.	$24,123
Royalty	717	Taxes	3,181
Theresa lease (18 d.)	886	Machinery (pump) .	4,486
Int. on loan (25 d.)	164	Dividend	11,250
	$50,751		$43,040

Carried to surplus, $7,711; surplus, November, 1902, $103,180; total, $110,891; appropriated for legal expenses in receivership suit, $15,000; cash on hand, December 1, 1902, $95,891. The dividend was increased to 1c. per share per month.

Isabella Gold Mining Company.—The annual statement shows that a large amount of prospecting has been done and considerable ore shipped, but that on the whole, the operations show a small loss. A large amount of leasing has been done and considerable ore shipped. The Snow Bird Claim, which amounted to a little over an acre of isolated fractions, was sold for $7,500. During the year there were 4,543 ft. of raises, winzes, drifts and crosscuts done by the company, and 1,790 ft. by lessees, making in all 6,333 ft., at a net loss to the company of $28,992, while in 1901 there were 6,612 ft. of shafts raises, crosscuts and drifts done by the company, and 614 ft. done by lessees, making a total of 7,226 ft., the net loss on all operations for that year being $76,962. The average gross value of the ore for 1902 was $30.53 per ton and the net value $20.15 per ton. The treasurer's report shows gross receipts from company ore of $63,062 and from lease ore $174,271, with a net loss at the mine for the year of $19,782. The net loss for the year was $28,992 and the surplus on December 31, 1902, was $109,453.

St. Patrick.—Considerable prospecting has been done recently by diamond drill, and it is understood that several good veins have been opened. At present the company is drifting from the 700 ft. level. The property is situated in Victor, south of the Gold Coin, and is being operated by European capitalists.

Stratton's Independence, Limited.—This property has installed a large new triple expansion pump, capable of handling 1,000 gal. of water per minute. As far as can be learned, the mine is doing fairly well and considerable ore is shipped.

IDAHO.

SHOSHONE COUNTY.

North American Gold Mining Company.—This company is capitalized at $150,000, with shares at $1 each. The directors are: C. S. Crysler, B. M. Crysler, J. M. Savage, G. H. Stephenson, all of Delta, and J. F. Griffin, of St. Paul, Minn. The company is for the purpose of placer mining, Delta being the principal place of business. This is the third placer company formed at Delta, C. S. Crysler being president of each.

White Cross.—This mine is on Moscow Mountain, 9 miles northeast of Moscow. A recent run of 20 tons is reported to have returned $25 in gold per ton. The rock was taken from the 225 ft. level in an inclined shaft, where the ledge has widened to 3½ ft.

INDIANA.

GIBSON COUNTY.

(From Our Special Correspondent.)

Several thousand acres of coal land have been leased near Ft. Branch by different land companies. Active work will begin in the sinking of new shafts for coal mining. The Ft. Branch Company has two sites, each affording outlet and shipping facilities.

ILLINOIS.

(From Our Special Correspondent.)

Illinois Coal Operators' Association.—At a meeting of the legislative committee of the association with the State mine inspectors and mine superintendents and managers at the State House at Springfield, on

January 12, to consider means of preventing the present reckless and extravagant use of powder in coal mines, the whole matter was referred to the State Mining Board, consisting of Richard Newsam, president; William Atkinson, vice-president; Hugh Murray, mining engineer; Lee Kincaid and Daniel Reese.

Springfield Coal Mining Company.—The organization of this company is now complete and all the mines are working under the new management. The company is a consolidation of the Riverton Coal Company, with two mines at Riverton, which company a few months ago bought the Junction Mining Company's mine at Springfield, and the Taylorville Coal Company, with a mine at Taylorville. The consolidation on January 1 purchased the mines of the Black Diamond Coal Company and Starnes Coal Mining Company, at Springfield, and the Christian County Coal Company at Taylorville. J. A. Agee, of Chicago, former general manager of the Riverton Coal Company, has been elected president, and D. D. Shumway, of Taylorville, former president of the Taylorville Coal Company, is general manager and treasurer.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

Central Oil and Refining Company.—This company, of Welch, capital $1,000,000, has been incorporated. J. B. Weaver, R. H. Childs and S. M. Scott are some of the incorporators, and they have the backing of a large number of citizens. The Childs' system of refining will be utilized and a large amount of land has been leased or purchased.

MICHIGAN.

IRON—GEOGEBIC RANGE.

Eureka.—Corrigan, McKinney & Co., who recently took hold of this old mine, at Bessemer, abandoned it after a few days' work.

Oliver Iron Mining Company.—This company has secured a lease of the old Puritan property between Ironwood and Bessemer, and will sink a shaft and develop the land. The mine has been worked by various parties for many years, without much success. Most of the operators did not do work of a character to give much actual information as to the merits of the mine.

With recent acquisitions of lands the United States Steel Corporation now has a practically unbroken line of lands along the formation extending 5 miles, and ending with the Norrie properties at Ironwood. The Puritan, the latest of these acquisitions, is to be explored at once very thoroughly.

IRON—MARQUETTE RANGE.

Beaufort.—This old mine, near Michigamme, has been recently taken over by Rogers, Brown & Co. for their Buffalo & Susquehanna Iron Company, and is to be made ready for mining about 200,000 tons this year.

Cleveland Cliffs Company.—This company has pumped out the Barasa workings and mining is now being carried on. The property will be thoroughly explored.

Maas.—The new sand shaft of this mine at Negaunee, which has been "hung" for nearly 6 months, is again sinking once more and may finally reach the ledge. It reached a depth of 136 ft. last April, and has not gone more than 5 ft. since. It must go 15 ft. more to reach the ledge. The opening of this mine will represent a cost of nearly $500,000, but the mine will be a large one and will be worked with the Negaunee when that comes into possession of the same owners next September.

Volunteer.—This mine, on the Cascade Range, recently transferred to the United States Steel Corporation, is to be worked heavily the coming season. The Steel Corporation now owns nearly all properties on the range, all but the Wheat and the Richmond, though it owns the fee to the latter.

MISSOURI.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Elizabeth Lead Company.—On account of internal dissensions the 400-acre tract of this company at Bonne Terre has been allowed to go to sale at Farmington, the county seat, under a nominal mortgage of $20,000. The sale takes place on January 31. This is very surprising, as it is regarded as one of the best tracts in the lead belt.

Federal Lead Company.—The large new smelter of this company at Alton, Ill., is smelting lead ores from the mines at Flat River and custom ores from Missouri and Illinois. It uses the Scotch hearth system for the first treatment and resmelts the Scotch hearth slags in water-jacket furnaces.

Manhattan Lead Company.—This new company has increased its holdings by the purchase of the 160-acre Davis tract in the Flat River District.

JASPER COUNTY.

(From Our Special Correspondent.)

Freedman.—The mine and mill and 80 acres of land 4 miles northeast of Joplin, belonging to Amos Freeman, of Joplin, were sold recently to A. A. Underwood, of Pittsburg, Pa., for $40,000. The mine has been making an average profit of $500 per week during the past year.

MONTANA.

BEAVERHEAD COUNTY.

(From Our Special Correspondent.)

Ajax.—The 5-stamp mill on this property is running successfully. The property is under the management of Wm. Stansfield, of Fox. This is in the Upper Big Hole Valley, fully 100 miles from the railroad.

Monument Copper Mining Company.—This property, situated 30 miles from Redrock on Bloody Dick Creek, has been equipped with machinery. Six men are employed during the winter.

FLATHEAD COUNTY.

Snowshoe.—This mine, near Libby, is now owned by the Rustler Mining Company, of which W. D. Wrighter is president, T. A. Noble, of Pittsburg Pa., is vice-president, and D. P. Bowers, of Spokane, Wash., secretary and treasurer. A. B. Coleman, of Pittsburg, Pa., is also interested. A strike of 2 ft. of galena ore is reported in the lower tunnel at 900 ft. A winze from this tunnel has been sunk nearly 400 ft., showing the ledge to be nearly vertical and 5 to 6 ft. wide. The ore is of milling grade, iron and lead sulphides, the iron sulphides carrying considerable gold. The company ships its concentrates to Omaha, hauling them by wagon to Libby, and is planning to increase the capacity of the mill from 200 to 300 tons a day. It will put in additional power, either with a flume or electric plant, to remedy the water supply during the summer.

POWELL COUNTY.

(From Our Special Correspondent.)

Blue Bird.—O. Bergstrom, of Butte, has secured an option on this property, near Elliston. A concentrator will probably be placed on the mine in the spring.

Emery.—Owing to threatened litigation between this property and the Blackrock over the apex, the management of the former has decided to discontinue operations for the time being.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Minnie Healey.—A very extraordinary state of affairs is before the Courts in connection with the litigation over this property. A. J. Shores, one of the attorneys representing the Amalgamated Copper Company, the real plaintiff in the suit of Miles Finlan vs. F. Aug. Heinze, is before Judge McClaren, of the third division of the Circuit Court, defending himself against disbarment proceedings instituted by Judge Harney, the Judge of the First Division of the Circuit Court. Judge Harney, in his complaint, claims that Attorney Shores, offered him a bribe of $100,000 if he, Harney, would grant plaintiff a new trial, and also sign an affidavit that Heinze had influenced his former judgment on the first trial of the case, in which judgment was given Heinze.

Nipper.—The old receivership matter regarding this property has been up before Judge Clancy relating to the fee to be allowed the receiver during his incumbency of 10½ months. The Court made an allowance of $16,000 and $10,000 to his attorneys. The suit was originally brought by the Hickey Brothers and John M. Stewart, original owners of the Nipper, against the Parrot Silver and Copper Company for trespass. Heinze having become interested in the Nipper through purchasing, came into the suit as an intervener, and asked for a receiver. The original plaintiffs and the Heinze interest to the suit being friendly, Judge Clancy granted the receivership on the Heinze application, Thomas McLaughlin getting the appointment. The Parrot Company appealed to the Supreme Court, which decided the lower court was in error and discharged the receiver after the latter had been in charge for over 10 months. During this time the receipts from the ore extracted amounted to $396,000, while the expenses ran up to $404,000, a loss of $8,000, or a total of $34,000, including the allowance just made receiver and his lawyers. Now both the Parrot Company and Heinze are to appeal from this last allowance of Judge Clancy's, claiming the fees are excessive.

Ophir.—This property is operated by the Ophir Copper Company, a recent corporation.

NEW MEXICO.

(From Our Special Correspondent.)

Great interest is taken in the opening of new fuel supplies and the discovery of important deposits of coal which have heretofore escaped notice. The gold deposits of the Black Range are continuing to attract attention and the Golden Cochiti appears to be on the eve of a complete transformation. The building of new railroads is stimulating work in localities which have heretofore been entirely undeveloped. The Santa Fe Central Railroad has already begun laying steel, and the contract for grading the Santa Fe cut-off has been let.

BERNALILLO COUNTY.

(From Our Special Correspondent.)

M. S. Otero is erecting a sulphur mill at the Sulphur Hot Springs in the Jemez Mountains, northwest of Albuquerque.

East of Albuquerque, in the Sandia Mountains, the proposed Albuquerque & Eastern Railroad is stimulating development work on old claims which have heretofore been too far removed from railroads to encourage extensive exploitation. At the Shamrock Group copper sulphide ores carrying some gold and silver values are attracting considerable attention. The Copper King vein is 8 ft. wide, and the ore also contains some gold and silver. The Chickering and Cocktail mines, owned by W. D. Kemp, are also working in what appears to be a good grade of ore.

In the western part of Bernalillo County the great demand for coal has largely increased the output of the mines. At Gallup the American Fuel Company has opened 2 large mines, one producing 1,600 tons per day. The entries of the Black Diamond Mine have now been driven over 3,000 ft., with coal 3 to 5 ft. thick. The Gallup Mine has just completed a new tipple with a daily capacity of 2,000 tons. A new hoist and 3,000 h.p. engines are soon to be added to this mine. There are 4 veins of coal.

VALENCIA COUNTY.

(From Our Special Correspondent.)

The new Santa Fe cut-off, passing 40 miles south of Albuquerque, the contract for the grading of which has just been let, has revived Caracito camp. The ores of this camp are reported to run 10 to 12 per cent in copper, with some silver values. Eastern capital is already taking considerable interest in the field.

One of the more important fuel discoveries is the recent find of coal in the Pecos Valley. The most promising occurrences are those near the Hamilton properties recently opened by C. O. Roberts.

NORTH CAROLINA.

CABARRUS COUNTY.

(From Our Special Correspondent.)

Billy Bost.—This mine has been purchased by George L. Andrews, of London, Eng., and is being developed under the charge of B. Tamblyn.

Parr.—This gold mine has been purchased by Mr. Andrews, of London, Eng., and is being developed under the same management as the Billy Bost. The vein is quartz, carrying galena, copper and iron pyrites, with gold and silver. The property comprises over 400 acres and adjoins the famous old Reed Mine, noted for its large gold nuggets.

Nugget.—This mine and adjoining properties continue to produce dust and nugget gold, together with rich gold bearing quartz. The property is owned by Richard Eames, Jr., of Salisbury.

Phoenix.—This gold mine is down 500 ft. in the main shaft and 200 ft. in the northeast extension shaft. The vein is quartz, with iron and some copper pyrites, both of which carry gold. A large quantity of ore is being developed in advance of the erection of reduction plant. Dr. F. L. Slocomb, of Pittsburg, Pa., is at the head of the enterprise.

MONTGOMERY COUNTY.

(From Our Special Correspondent.)

Iola.—This gold mine continues to produce $10,000 each month at an expense of $2,000 on the 10-stamp mill. Capt. Milt Jones, of Troy, N. C., is the manager and largest stockholder.

Russell.—This mine, which shows a large body of low grade gold ore that has produced over $600,000, is about to change hands. The 5-stamp mill on the Palmer lot, being operated by O. M. Allen, of Kalamazoo, Mich., is making good returns.

ROWAN COUNTY.

(From Our Special Correspondent.)

Gold Hill.—The water has been pumped out and at the bottom, 800 ft., the vein shows ore carrying copper and iron pyrites, with gold and silver. The 40-stamp mill and 12 Wilfley concentrators are busy day and night. The concentrates are shipped to the Nichols Chemical Company, of New York City. Walter George Newman is at the mines.

STANLEY COUNTY.

(From Our Special Correspondent.)

Whitney Reduction Company.—This company has bonded the Barringer Mine, near Gladstone, and is developing it under the direction of Col. E. B. C. Hambley, president of the company.

PENNSYLVANIA.

ANTHRACITE COAL.

Anthracite Mine Inspectors.—The mine inspectors under the new law re-districting the anthracite region are as follows: First District, Luzerne County—Edward Reynolds, Hugh McDonald, David J. Roderick, P. M. Boyle and David T. Davis. Second District, Lackawanna County—Edward Roderick, Henry O. Prytherch, P. J. Moore and David T. Williams. Third District, Carbon County—Edward J. Roderick, until

the meaning of the law is finally decided. Fourth District, Schuylkill County—William Stein, P. C. Fenton and Charles J. Price. Fifth District, Northumberland County—James R. Tinley. Sixth District, Columbia County—Martin Kelly.

Charlton Coal Company.—This company, composed of A. J. Lathrop, Kingston; Jos. G. Sarricks, Wilkes-Barre; E. A. Oberrender, Drifton; Dr. W. S. Jenkins, Sheppton, and Thomas Charlton, Sandy Run, will mine coal near Pond Creek, on property east and northeast of the old Pond Creek workings. It has been proven by Thomas Charlton, who has been for upwards of 30 years general mining superintendent for M. S. Kemmerer & Company, of Sandy Run.

BITUMINOUS COAL.

United Coal Company.—This company, of Pittsburg, has purchased from Dr. A. M. Price, of West Elizabeth, and W. T. Pierce, of Pittsburg, 30 acres of land in Lincoln Township for approximately $40,000. The property lies a mile south of Elizabeth. The coal company will extend its coal road from new mines recently opened near Elizabeth along the front of the property to its coal tipple on the Monongahela River.

Washington Coal and Coke Company.—This company, for which N. P. Hyndman, of Pittsburg, is sales manager, has received a contract from the H. C. Frick Coke Company for 500 tons of coal daily to supply the Douglass Coke Works, near West Newton, where the coal supply has been exhausted. The contract runs through 1903.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Saginaw Gold Mining Company.—The shaft is 210 ft. deep, and is being timbered. Another ledge of gold-bearing quartz has been encountered.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Golden Crest Mining Company.—The new mill is dropping 5 stamps. It is supplied from old dumps on the ground pending further developments in the mine.

Monarch Mining Company.—James Brody, lessee, is making regular shipments of ore to a smelter. It requires careful sorting.

Pluma Mill.—Messrs. Hall and McConnell have started the new 60-ton cyanide plant at Pluma on impounded Homestake tailings. Crushing machinery has been installed and the owners have purchased a mine of low-grade ore, from which they will supply the plant after the tailings are exhausted.

Rex Mining Company.—Officers have been elected as follows: J. A. Steele, of Minneapolis, Minn., president; M. B. Copeland, Omaha, Neb., vice-president; John Gilroy, Lead, second vice-president; A. C. Davis, Lead, secretary-treasurer; E. C. Steele, Lead, superintendent. The company owns 140 acres in the siliceous belt of Bald Mountain District.

Ruby Gold Mining Company.—The company has decided to build a mill in the spring, its size to be determined by developments in the mine during the winter.

Sunday & Rattlesnake.—C. B. Harris, who has been working under a lease, has resumed shipments to a cyanide plant.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Central Black Hills Copper Company.—The leaching plant is nearly finished, and will make its initial run in February. A supply of ore is being taken out of the mine.

Dakota Calumet Copper Mining Company.—The building for the new smelter at Sheridan is enclosed and the machinery is arriving.

Gold Standard Development Company.—A tract of mineral land on Rapid River is being developed. John Donnelly, of Rapid City, is superintendent. Stock is largely held by Akron, O., parties.

Ivanhoe Gold Mining Company.—Work has been resumed and the shaft is being deepened. A car-load of ore is being mined for a test. The property is in Chilkoot District.

TEXAS.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Sour Lake Springs Oil Field.—Roche well No. 3 came in recently and great difficulty is being encountered in controlling the gas and oil. The flow is estimated at over 5,000 bbls. daily. A pond of oil has been formed by dykes and the owners expect to save a large portion of the output. The oil goes to the J. M. Guffy Petroleum Company under a contract.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Beaumont Oil Field.—The Heywood Oil Company has declared a 2 per cent dividend, making a total of 18 per cent paid in dividends to stockholders in 14 months on a capital of $800,000. The company has recently bought 10 acres at Sour Lake and has contracted for 2 wells. It is also drilling 2 additional wells on its Spindle Top property.

The J. M. Guffy Petroleum Company well, McFadden No. 15, is down 900 ft., and will widen the field 400 ft. if it is a producer. The company's pipe-line from Beaumont to Sour Lake Springs is completed and pumps are being installed.

The Lone Star & Crescent Oil Company's affairs are in bad shape and on application to the Court, A. W. Crandall and Gustave Lemie, of New Orleans, La., have been appointed receivers. The proceedings occasioned no surprise, as they are the culmination of bad judgment and unwise contracts. The company owns the only pipe-line in New Orleans, but consumers have had trouble in obtaining contract oil and many will be forced to close their factories until furnaces are equipped for burning coal.

Oil shippers state the 3 per cent tare charged by the pipe-lines for loss by sand, water and evaporation is excessive. They think 1 per cent would be sufficient to offset all loss. The production of the field is about 18,000 to 20,000 bbls. daily and all estimates of 12,000,000 to 14,000,000 bbls. of oil in store are absurd, when it is known that shipments for months past have exceeded the production.

Crude is worth 48@52c., in tanks.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion Settlements.—The Salt Lake banks report settlement as follows: Bullion, $230,200; gold, silver, lead and copper ores, $175,600; gold bars, $21,300; auro-cyanides, $2,200; total, $429,300.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Horn Silver.—This mine sent to the smelters 4 cars of ore for the week ending January 16.

Cactus.—Bids for contracts are opened. The specifications are for a power plant at the mouth of the long tunnel.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—The samplers report these receipts for the week ending January 16: Grand Central, 30 cars; Uncle Sam, 7 cars; Yankee Consolidated, 5 cars; Lower Mammoth, 3 cars; Ajax, 2 cars; Mammoth, 9 cars; Bullion-Beck, 10 cars; Gemmi, 5 cars; Carisa, 1 car; total, 72 cars ore.

Centennial-Eureka.—There are now 170 people on the payrool. A daily output of 225 tons goes to the bins of the United States Smelter at Bingham Junction.

Little Chief.—A strike is reported at a depth of 1,000 ft. showing 30 in. of good ore.

Martha Washington.—Ore is being raised from below the 250 ft. level.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Shipments.—The Taylor & Brunton sampler reports the following receipts for the week ending January 16: Storey, 2 cars; United States, 5 cars; Columbia, 1 car; Yosemite No. 1, 1 car.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Park City Shipments.—The Mackintosh Sampler reports the only receipts for the week ending January 16 were from the Daly West Company, 4,254,070 lbs. of ore.

Zinc Plant.—The plant for the treatment of zinc ores will, within a fortnight, be ready. It is expected to have a daily capacity of about 80 to 100 tons.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Stockton Shipments.—The Ophir Hill has sent the weekly output of 10 cars of silver lead concentrates. The Utah Mine at Fish Springs reports 1 car for the week.

Consolidated Mercur.—The regular dividend of 3c. per share, or $30,000, is posted to be sent around February 9. The mill continues to treat the same tonnage.

Sacramento.—The retort for the reduction of the cinnabar ores is in position.

VERMONT.

LAMOILLE COUNTY.

(*From Our Special Correspondent.*)

New England Asbestos Company.—The asbestos mines at Eden, owned and operated by this company, are reported abandoned, as the property does not turn out the quantity and quality of asbestos expected. At a recent meeting of the directors in Fall River, Mass., it was decided to increase the capital to $1,500,000 and secure options on several properties in Canada. The concern will be known as the New England-Canadian Asbestos Company. About $200,000 was put into the plant at Eden. A portion of the machinery will be removed to the new mines.

RUTLAND COUNTY.

Vermont Slate Company.—This new company will have its headquarters in Granville, N. Y. It controls about 1½ miles of one of the slate veins on the Dillingham and Thomson farms in Pawlet, just south of Granville. The capital stock is $50,000. The Williams & Schmid Slate Company, whose quarries have been in operation for some years, have sold to the new company, whose officers are: President and treasurer, John G. Williams, of Fair Haven; Henry F. Rohrnan, vice-president and treasurer of the western branch; Stephen Mills, Jr., Caldwell, O., manager of the western branch. The directors are: J. G. Williams and J. A. Williams, of Fairhaven, Vt.; H. F. Rohrman, Stephen Mills, Jr., H. F. Achanir, Zanesville, O.; J. H. Richardson, Erie, Pa.

WEST VIRGINIA.

Davis Coal and Coke Company.—The following directors were recently elected; Winslow S. Pierce, Lawrence Greer, F. S. Landstreet, T. B. Davis, Jr., New York; C. W. Dailey, Elkins, W. Va.; B. H. Griswold, J. T. M. Barnes, Baltimore. Mr. Landstreet was chosen president. This company is the chief subsidiary corporation of the West Virginia Central & Pittsburg Railway, now controlled by the Western Maryland Railroad, owned by the Goulds. It is the medium by which the West Virginia Central's coal is mined and sold.

United Supply Company.—United States Steel Corporation interests have organized this company, to conduct a general store system in the Pocahontas coking district, where the United States Coal and Coke Company is now erecting a number of coking plants. The United States Company is under the management of the H. C. Frick Coke Company, of Pittsburg, and the United Supply Company will be operated under the direction of the Union Supply Company, which has 45 stores in Westmoreland and Fayette counties. The headquarters of the United Supply Company will be in the Carnegie Building, Pittsburg, Pa. J. W. Anawalt, general superintendent of the Union Company, is vice-president of both the Union and the United companies.

The Norfolk & Western is extending a spur up the Tug Fork of the Big Sandy River for the accommodation of the United States Coal and Coke Company, which will make a development of at least 1,000,000 tons a year. The Morgantown & Kingwood has been pushed into Preston County for the purpose of developing coal.

FOREIGN MINING NEWS.

CANADA.

ONTARIO.

Moose Mountain Mining Company.—This company, capitalized at $1,000,000, and the Hutton Mining Company, with the same capital stock, have been organized to develop the iron range north of Sudbury, discovered some time ago by Railroad Commissioner Chase S. Osborn. The incorporators of both of the companies are Chase S. Osborn and Otto Fowle, of the Soo, Mich., and Messrs. Hearst, McKay and Darling, of the Soo, Ont. The companies control 5 miles of the range along what is known as the Moose Mountains. The iron formation is reported to extend 30 or 40 miles. The principal discoveries of apparent greatest value have been along the west branch of the Vermillion River, prolonging northwest and southwest into the township of Hutton in the District of Nippissing. To the northwest the range runs into an unsurveyed territory of the Algoma District. The ore is a hard magnetite, reported to run from 60 to 67 per cent metallic iron, with much low enough in phosphorus to be of Bessemer grade. The ore is without a trace of titanium. The work done up to the present time has consisted of locating and securing titles to the properties, road building, camp building, diamond drilling, trenching, cross-cutting and test pitting. In this sort of work alone there has been expended over $100,000.

NOVA SCOTIA—GUYSBORO COUNTY.

Richardson.—This gold mine at Isaacs Harbor, 100 miles east of Halifax, is reported sold to a syndicate of Boston, Mass., men represented by Ira Miller, of Westfield, Mass., and Charles M. Donohoe, of Lynn, Mass. The mine is one of the best known gold properties in the Province.

MEXICO.

DURANGO.

Descubridora.—This company has ordered from a Pennsylvania concern a number of pumps for its mines, and also a large hoisting equipment from the Lidgerwood Manufacturing Company, of New York City.

GUERRERO.

(*From Our Special Correspondent.*)

Minas Viejas Mining Company.—This company, whose property is in Taxco, is about to increase its capital by an issue of 2,000 shares of $5 each.

LOWER CALIFORNIA.

(*From Our Special Correspondent.*)

Boleo Copper Company.—A steamer arrived recently at Guaymas with 280 tons of copper in pigs shipped by this company at Santa Rosalia. The copper was sent to the United States for shipment to Europe.

MINING STOCKS.

(Full quotations are given on pages 172 and 173.)

New York. Jan. 20.

The market has developed weak spots that are likely to discourage speculation. What was believed to be a revival of the old boom times in the Comstock stocks has proved to be a jack-in-the-box performance. Unfortunately many people have increased their holdings at advancing prices, and now have the pleasure of paying a new crop of assessments on a declining market. While these investors are awaiting a recovery in prices others are quietly unloading and taking what profits they can. Holders of Best & Belcher who bought at $4.35 have suffered a loss to $1.95, although on Monday the San Francisco quotation was as low as $1.50. A 15c. assessment is being collected by this company. Ophir, after touching $3.20, slumped to $2.50 on Monday, and on Tuesday was quoted at $1.85 in San Francisco. A 15c. assessment is also due on this stock.

Consolidated California & Virginia spurted to $3.10, but when a 25c. assessment was called, dropped to $1.80, at which it is almost featureless. Mexican tumbled from $3 to $1.75, and will go lower, as the San Francisco market is particularly weak. Potosi lost 40c. at 60c., and is collecting a 5c. assessment. Occidental Consolidated slipped from $1 to 57c., and Union from $1.05 to 90c. Hale & Norcross weakened from $1.25 to 85c., and closes unsteady. Yellow Jacket, with a 10c. assessment on the docket, sold around 90c., but it closes weak. Gould & Curry brought 75c., Savage 95c., and Justice 40c., but all exhibit a softening tendency. Considerable business has been done in the securities of the Comstock Tunnel Company. The stock and bonds sold at about the same figure, 9@10c. Belcher dropped from $1.50 to 75c.

In the copper list pool operators have played a strong hand in Amalgamated. After the regular quarterly dividend of ½ of 1 per cent was declared the price was elevated to $65⅛, but when sales assumed larger proportions the market weakened again to a $63 basis. Anaconda is listless, selling at 96@97½ per cent ($24@$24.35).

The curb coppers were helped by several important announcements. Greene Consolidated, of Mexico, was helped by the settlement of the Marcus Stine suit against President Greene. The complainant received 5,000 shares in lieu of the 400,000 shares optioned to him in 1898. This is believed to be the last suit of the kind to be satisfied. Consequently Greene shares have advanced from $22½ to $24½, but at the close they are fractionally weaker. British Columbia suffered a decline to $4, to emphasize the opinion of some stockholders as regards the proposed $750,000 increase in the capital stock on February 10. About a year ago the stockholders had voted an increase from $1,000,000 to $1,250,000. The present increase is for constructing a reverberatory furnace and converter plant, purchasing additional property and making such other improvements as will strengthen the operations of the company. Almost simultaneously with this announcement comes the report that leading interests who advanced $150,000 to the Montreal & Boston Company to erect a smelter on its British Columbia property have expressed their willingness to accept the 30,000 treasury shares it holds at $5 to liquidate the indebtedness. This price is more than double what is quoted on curb, the last sale being made at $2.

Tennessee is fractionally stronger at $16, and odd sales of United of Montana are reported at $29½@$28. White Knob of Idaho is off ⅜ at $10⅝.

Ontario Silver of Utah is weak at $6¼@$6½. Daly made a sale at $1.90.

Quicksilver common, of California, rose from $2 to $2¾, but dealings are small. Brunswick Gold sold at 9c.

Few Colorado stocks are being marketed. Portland, of Cripple Creek, gained 5c at $1.85, while Isabella hangs around 30c.

Boston. Jan. 20.

(From Our Special Correspondent.)

New York buying has been a big factor in the local mining market the past week, more particularly in the case of Utah Consolidated, Bingham Consolidated, and Copper Range Consolidated. Utah has been traded in in large lots with the result of a $5 advance to $28.75. Large blocks of the stock have lately been transferred to the name of H. H. Rogers and other prominent people affiliated with Standard Oil interests. Utah closed to-night at $26.50, but it is believed that the stock has only begun to move. Bingham has also been taken in fair amounts, causing the stock to advance $5.62½ to $34.62½, closing $1 below this. The company has been favored by advices that a rich strike has been made in the Brooklyn, one of the Dalton & Lark group, at the bottom level.

That a deal is on in the South Range group of mines there is no doubt. Copper Range, Trimountain and St. Mary's Mineral Land come in under this head. Copper Range has risen $2.25 to $66.50, but reacted to $64. There has been a considerable amount of manipulation going on in the stock, but it is reckoned as backing and filling subsequent to a much larger rise. St. Mary's Mineral Land owns a one-half interest in the Champion, besides owning over 110,000 acres of mineral land. Its Champion ownership necessitates its possession in the deal. St. Mary's stock has lately risen from close to $30 to $54. Current gossip is that Copper Range will go in at $90 and Trimountain close to $130 per share. St. Mary's price is not mentioned, but some believe it will be nearer the former price. Trimountain has been quiet at $92. There has been dividend talk on Copper Range, but it was premature. The last instalment on the new issue of St. Mary's stock was paid to-day.

Calumet & Hecla touched $544, which represents a rise of $124 from the low price in December, or $12,400,000, expressed in market value. The 50c. reduction in the Quincy Mining dividend to $2.50 had no effect on the market, as a reduction had been generally expected. The stock sold at $114@$110. Winona has been well bought up to $8.75, against $6.25 a week ago. The Lake has been a considerable buyer, a house taking 2,000 shares in one day. Mohawk's $2 assessment was paid Monday, which gave the stock a start in the market from $49.75@$51.75.

Daly West took a sharp drop of $5 to-day to $36.50. It is said that dividend money may be used to explore the Quincy property. United States has also been active up to $23. The company has had the usual embarrassments met in starting new machinery. Centennial set a good pace by rising $4.50 to $26.75, with subsequent reaction to $24.50.

Tamarack and Osceola have been dead, the former selling around $150@$152, and Osceola around $61@$63. The deal between Mass and Adventure has been declared off, but it is likely that new combinations may be entered upon, which will include one or both of these companies. Sentiment seems to favor a higher range for all class of copper mining shares.

Colorado Springs. Jan. 16.

(From Our Special Correspondent.)

The market presented a rather disappointing aspect this week, in that it failed to maintain the improvement which was noted last week. Prices on the whole went off and while no serious slumps were recorded the market has failed to hold its own. The market is in a reactionary spirit; and speaking in this connection, perhaps the best trait about it is its sensitiveness. Anything is to be preferred to a stagnant market; for anything with life enough in it to make it move has the possibility of getting somewhere. And this correctly describes the local market this week. It was disappointing to see prices go off after Monday, but the drop came and must be recognized.

A surprise and disappointment resulted this week from the announcement that the directors of the Gold Coin and the United Gold Mines companies, at their monthly meeting yesterday, decided to make the dividends of these concerns quarterly instead of monthly. The officers do not state whether a lump dividend will be paid quarterly instead of a monthly disbursement, or whether this new order of things means that the dividends are to be reduced. Mining men are divided in their opinions and no conclusion can be arrived at until an official statement is made covering this point.

Isabella sold at 29⅞@29c., the weakness being caused without doubt by the contest between the Lennox-De La Vergne faction on one hand and the Williams-Stone faction on the other. Both sides have indulged in abuse of the opposite party and the prediction made several weeks ago in these columns of a bitter personal fight has been fully substantiated by present developments.

Salt Lake City. Jan. 16.

(From Our Special Correspondent.)

The movement of stocks this last week has been irregular. Some of the lesser lights have gained and some lost, but the heavyweights remain unchanged. Daly West records a drop to $42 from $44.20 at the opening, with sales of but 810 shares. Consolidated Mercur receded this week to a lower figure than for some time, 6,700 shares being sold at $1.71@$1.67. Grand Central had sales of 300 at $5.50@$5.40. This is an advance over former prices of 20c. Sacramento sold 11,400 at 29½@25c. Wabash, which is again seeking lower levels, sold 16,300 at 44½@30¼c. at the close. The total amount of business was 194,778 shares, which brought in selling price $143,454.

San Francisco. Jan. 17.

(From Our Special Correspondent.)

The boom continues and dealings have been very active. With Caledonia selling up to $4 or over; Best & Belcher reaching $4, Mexican $2.90, and Potosi $2.70; with almost every stock on the list selling freely and at advanced prices, the Exchange begins to look like old times. Of course, there have been sharp reactions, but most of them have been made good and the general range of prices is better at the close than ever. Just what started the boom nobody knows. How long it will last is another problem. Meantime, traders are making money and the "chippers" no longer rule the market.

The sworn reports of the mining companies, as filed in their offices this week, show cash on hand January 1 as below, with all expenses paid, unless otherwise noted: Alta, $21, with indebtedness of $2,468; Alpha Consolidated, $1,079; Andes, $984, with indebtedness of $5.60; Belcher, $869, with liabilities of $7,300; Best and Belcher, $670, with bills payable of $10,000 and $3,000 due bank; Bullion, $1,222; Caledonia, $11,226, with December expenses unpaid; Confidence, $2,409, with December expenses unpaid; Consolidated Imperial, $1,576; Challenge Consolidated, $375; Crown Point, $1,921, with December expenses unpaid; Chollar, $300; Gould & Curry, $9,014, with bills receivable of $10,000 and liabilities of $12,051; Justice, $4,785, with liabilities of $7,216; Lady Washington, $102, with indebtedness of $1,082; Mexican, $767; Ophir, $579; Overman, $5,014, with December expenses unpaid; Potosi, $377; Savage, $1,470; Sierra Nevada, $267; Silver Hill, $18,540; Standard Consolidated, $110,456, with December clean-up and December expenses to be accounted for; Syndicate, $2,128; Union Consolidated, $3,343; Utah Consolidated, $1,646.

The Consolidated California & Virginia reports an indebtedness of $23,572 on January 1.

These statements do not show any special ground for the boom. Neither do the two assessments announced this week—25c. a share on Consolidated California & Virginia, and 10c. on Chollar.

Business in oil stocks was active and prices generally good. Hanford sold at $112; Home, $3.15; Sterling, $3.05; Twenty-eight, $2; Sovereign, 48c.; Independence, 16c.; Junction, 15c.; Lion, 8c.

The monthly record of sales on the California Stock and Oil Exchange for 1902 is as follows:

Month.	Shares.	Value.
January	187,584	$81,633
February	28,562	76,447
March	214,293	109,364
April	442,231	239,938
May	213,483	185,594
June	110,435	54,140
July	53,156	35,832
August	69,193	57,207
September	50,856	40,802
October	61,525	32,659
November	72,698	65,853
December	97,396	72,201
Totals	1,601,421	$1,051,670

December showed more sales than any other month in the second half of the year.

London. Jan. 10.

(From Our Special Correspondent.)

The South African mining market keeps quiet, and there has not been any speculation in high-priced shares such as was reported by me last week. The progress of Mr. Chamberlain is being watched closely, but as it is not expected that he will inaugurate any new policy differing in any essential point from Lord Milner's. The chief question of interest to the mining market is the future arrangements for the financial burdens to be borne by the mines, and as it is granted that Mr. Chamberlain's views will be those of a business man, there is not much anxiety. The market, therefore, exhibits no impatience and there are no booms nor bear raids.

The universal topic of discussion in mining circles here is the fraud committed by Mr. A. S. Rowe, secretary of Great Fingall Consolidated and a recently admitted partner in the firm of Bewick, Moreing & Co. In addition to his having borrowed money on forged certificates on the company of which he was secretary it appears that he has also "fraudulently applied to his own use certain moneys of the company." Of course a warrant is out for his arrest and as the police and Sir George Lewis, acting for people who lent money on the certificates, have taken up the matter in an energetic way, it can hardly be doubted that he will be found eventually and brought to justice. At the present time Mr. Moreing is in the far east, but is hurrying back as fast as possible. The two other partners, Mr. Hoover and Mr. Wellsted, are in London, and as they, as well as Mr. Rowe, are young men only recently admitted into partnership, their position is an unenviable one. Mr. Moreing has announced by cable that he will hold himself responsible for the repayment of all moneys wrongly obtained. There is no legal necessity for him to do so, and the amount missing is variously figured at anything up to £200,000. There is much more in this case than meets the eye, but in the interests of justice it is advisable to let things lie quiet. The chief reason for regretting the incident is, as I mentioned last week, that West Australian mining has once more sunk in the public estimation. The management of many of the West Australian mines has been a scandal in the past, and nobody has helped more to pull the mines out of the quagmire of disrepute than Bewick, Moreing & Co. West Australia seems to have a special fate watching over it to suppress all efforts.

The issue of the report of the Snowshoe Gold and Copper Mines, Limited, owning the mines of that name in the Boundary District, British Columbia, has created a favorable impression. There have been so many failures recently of English companies working in that province that the shareholders in the Snowshoe deserve special congratulation. The ore is of low grade.

but as the mine is situated on the railroad, is within easy reach of smelters, and the ore can be mined in open quarry, there is every reason to expect that the company will make a profit. The mine is now shipping 1,500 tons a week and in a short time the shipments will be 3,500 tons a week. The ore in sight is over a million tons, so that the company can look far ahead. It is probable that the company will decide to build smelters of its own at no distant date. The condition of things generally is eminently satisfactory and reflects credit on the management.

There is an increasing interest taken nowadays in Mexico as a mining country. There has been one or two unfortunate speculations made in Mexico by London companies during recent years, but El Oro has helped to win back favor for the country. It is a matter for surprise that English people do not turn their attention to Mexico more, instead of letting Americans take up all the best things. The fact is, however, that the knowledge of the modern political history is limited and the impression has not been removed that the country is on a par with the rebellious and mismanaged Spanish states of South America. Some very good work has been done by Mr. Frederick Hawdon in introducing Mexican properties to London speculators and as the companies he forms are not over-weighted with capital and purchase price, they make very satisfactory returns to their shareholders. One of his companies, the Parral, has not got on so well, owing to some difficulty of adapting the plant to the ore and shareholders appear to be dissatisfied. At any rate, the shares have been sold rather cheap lately. I believe, however, that the mine will be all right, and if the ore is not suitable for stamp-milling it can be sold to customs smelters in the same way as the Diaz and Beckman ores, that are also controlled by Mr. Hawdon. I understand that Mr. Hawdon has recently acquired another Mexican property that is to be floated here shortly.

COAL TRADE REVIEW

New York. Jan. 22.

ANTHRACITE.

The demand for anthracite continues very heavy from all consuming territories, but with a short spell of mild weather, the situation at Eastern points will be much improved. At points in the Northwest, or in Chicago territory, however, relief will hardly come before spring, owing to the long rail haul and the heavy demands of traffic on all railroads, which make the anthracite roads unwilling to send any great number of cars so far. Much has been written by uninformed newspaper men about the miles of cars lying at the mines and at tidewater and of a conspiracy between the anthracite roads and independent operators by which coal is being held for higher prices. It ought to be apparent, however, that the only way the companies can make money is by selling coal and that the only way the mines can turn out their present record-breaking tonnages is by the railroads keeping cars on the go. Probably over 50,000 tons, or 2,000 cars, arrive daily at New York Harbor shipping points, and it is safe to say that the majority of these cars are unloaded as promptly as possible. A reporter who goes to any terminal on the New Jersey side of New York Harbor to-day will see long lines of loaded cars—he will see long lines of cars to-morrow, but if he will take the trouble to note car numbers he will quickly find out that the loaded cars he sees to-morrow are not those he saw to-day. The same applies to stories of loaded cars lying at the mines. It should not be long now, if transportation remains good, before the public along the seaboard will begin to wonder at its foolishness in getting excited and playing into the hands of speculators.

In the Northwest anthracite supplies are nearly exhausted and but little coal is arriving all-rail. In Chicago territory all-rail arrivals show some improvement, but the demand is heavy, and what supplies were on dock when navigation closed are fast diminishing. Along the Atlantic seaboard conditions have improved. Heavy arrivals of Scotch and English coal have affected the demand at points beyond Cape Cod, while at New York and Philadelphia warmer weather has caused breaks in the prices of coal sold by independent operators. Last week the price fell to $8.50 f. o. b. New York Harbor shipping port. A few days of cold weather sent the price back to $10 or even $10.50, but the price has fallen to $8.50 again and with mild weather may fall to below $8. The regular price of the anthracite road coal is $5 f. o. b.

BITUMINOUS.

Compared with the feverish excitement of a few weeks ago the Atlantic seaboard bituminous trade is now quiet. Speculative prices, though high, ranging around $6.75 f. o. b. New York Harbor shipping port for Clearfield grades, show no tendency to advance. This quiet condition of the market is not due to larger arrivals of domestic coal at tidewater, but rather to the large foreign shipments now beginning to arrive at New England ports, relieving the domestic market of a large proportion of the New England demand. English and Scotch coals are being offered at $5 alongside at any port along the North Atlantic seaboard within 3 weeks of receipt of order. Such offers in point of delivery are as good as if not better than domestic producers are offering or can offer. Very few vessels can count of getting to a loading port, securing a berth and being loaded within a week, and it is a rash man who counts on any sailing craft arriving at a receiving port and discharging within two weeks.

The general complaint in the trade this week is of large seizures of coal by the railroads, it being almost a daily occurrence for shippers to have from 5 to 25 cars taken. Apparently the seizures are on a basis of 25 to 35 per cent of the cars each shipper receives at his mines each day. These seizures make it impossible for shippers to say whether they will be able or not to load vessels awaiting cargoes according to schedule and cause much annoyance. Also the seizures have probably helped keep up speculative prices of late. It is suggested as an explanation of the seizures that some large contracts to supply the railroads may have expired.

Trade in the far East is quiet on account of the arrivals of foreign coal. Consumers are taking all the domestic coal on contracts that they can get, but it is thought that more than enough foreign coal is arriving to supply needs of buyers where wants are not covered by contracts. Along Long Island Sound consumers are taking all the contract coal available, receipts of which seem to be falling off, and filling in any shortages with speculative coal. At New York Harbor points trade is quiet and consumers seem fairly well supplied. Supplies in the all-rail trade are better than they were; but there are still shortages and at some points conditions are pretty, although the railroads and producers are trying to better the supply.

Transportation from the mines to tidewater takes a week. Car supply at the mines is from 25 to 35 per cent of the demand. In the coastwise vessel market vessels seem in plentiful supply. Current rates from Philadelphia are: Long Island Sound, $1.25; Boston, $1.90; from New York Harbor, $1 to Long Island Sound points, and $1.50 to Boston. At New York barge rates are 30c. from upper harbor and 35c. from lower harbor points.

Birmingham. Jan. 19.

(From Our Special Correspondent.)

In some circles complaint is to be heard about the short supply of equipment, but as a general proposition the railroads seem to be doing better than before and the production and shipments are heavy. Inquiries for coal have been received both from the West and from the East, but no efforts have been made to get any of this trade, because the railroads were not anxious to send their coal cars too far out of the district. Chicago people were very anxious to purchase coal in this section and even with a $3.70 per ton freight rate it was figured out that coal could be bought in this section and delivered in Chicago at a profit. Alabama coal has been asked for also by Eastern folks. Mayor Drennen, of Birmingham, on Saturday last telegraphed to the mayors of New York City and Chicago that he had 50 cars of soft coal for the poor of those cities, 25 cars for each place, provided some assistance was given in the transportation to the places named. The coal will probably be shipped and will reach the destination before the end of this week.

Good prices prevail for coal. There is a strong demand right at home. Because of this demand the statement is made that some of the coke ovens are being shut down to prevent any possible waste of the fuel. Wherever possible, all mines are increasing their output.

Articles of incorporation of the Central Cahaba Coal Company, with a capital stock of $50,000, were filed in the Probate Court in Birmingham during the past week. The principal stockholders are: T. H. Spencer, R. R. Stobert and W. H. Soper, of Birmingham. The mines are to be located about 15 miles south of Birmingham. The Sloss-Sheffield Steel and Iron Company will shortly be able to start up their ovens at Flat Top Mountain mines, where convicts are getting out coal.

Chicago. Jan. 19.

(From Our Special Correspondent.)

Activity of sales, high prices, scarcity of high-grade coal and slow movement by the railways, continue to characterize the wholesale coal market. The cold weather that has prevailed, except for a very few days of mildness, since the middle of December, has exhausted, or very nearly exhausted, the anthracite supplies laid in by boat late in the season of navigation, and made smokeless and other high-grade coal very scarce. To-day's quotations are: Pocahontas and smokeless Maryland, $6.50; Hocking, $6; Pittsburg and Youghiogheny, $5.50; West Virginia, $5.50; Indiana and Illinois lump, $5@$5.50; Indiana and Illinois run-of-mine, $4.50@$5. Much coal is being given away or sold at cost price by the charitable organizations and the police.

The railroad situation seems to be slowly improving and the resumption of work at the mines after the Christmas holidays has made an improvement also in the supply, as compared with last week. The principal difficulty, so far as city trade is concerned, is that of getting teams and teamsters; everything possible in the shape of both is being hired, at prices 50 to 100 per cent higher than are paid ordinarily.

With the ostensible object of driving out the speculative element of the coal trade, the railroads are restricting re-consignments to only one. This regulation was suggested by the railroad men who attended the aldermanic investigation into the coal scarcity and high prices. It was first applied on the Pennsylvania and has become general. The $1 a day demurrage rule has stopped much of the brokerage trade, but in times like these, of extraordinary scarcity, some firms have stored coal for as long a time as 30 days, in cars, rather than take chances of being left without a supply from the mines. Confiscation of coal is becoming general by the railroads, which are pressed to a greater degree than they have ever before experienced.

Cleveland. Jan. 20.

(From Our Special Correspondent.)

The coal situation all through this territory has been relieved during the past week by a circumstance among the railroads. The congestion in the freight yards had become quite serious and threatened to become still more so when several of the coal-carrying railroads issued embargo notices in which they refused to receive anything but live stock, perishable goods and coal and coke. The yards, which had been congested very seriously and the main tracks of the various lines, which had been crowded with the trains, began to show the effects of the embargo and the coal has been coming forward freely.

The result has been that whatever shortage of coal there has been in or about Cleveland has been in the main relieved. The factories have not suffered much. Some of them which have been shut down for invoice have not resumed operations, indicating, possibly, a shortage of coal, and others have been crippled; but the scarcity is not as severe as might appear from many of the statements concerning it. The shipments of hard coal into Cleveland are now only about one-third of what they were a year ago, but there is an increase in the bituminous coal shipment which more than makes up for this shortage as far as the house supply is concerned. The factory trade has not been hampered, as said above, and there is every reason to believe that the supply will be better before it is worse, despite the pending cold weather.

Pittsburg. Jan. 21.

(From Our Special Correspondent.)

Coal.—The demand continues heavy and the production is limited. During the last few days not more than one-half of the railroad coal mines were in operation. All the mines on the main line of the Baltimore & Ohio Railroad and all but three on the Wheeling Division were idle most of last week. Nearly all are running to-day, as a large number of empty cars have been furnished. It is not known how long the good supply of cars will continue. At the close of the annual convention of the district coal miners' organization last Saturday a strong resolution was passed laying the blame for the shortage of coal on the railroad companies. It declared that during the past three months the miners have not been employed more than half time. Fancy prices are still being offered for any grade of coal, but the producers are unable to take care of any new business.

Connellsville Coke.—The shipments show a slight improvement, but there is not a sufficient tonnage going into the Mahoning and Shenango valleys to permit the full operation of the merchant blast furnaces. A number are still idle. High premiums are offered for prompt shipment and some stiff prices have been paid. The *Courier* in its last weekly report gives the production in the Connellsville region for the previous week at 237,966 tons. The shipments aggregated 10,056 cars, distributed as follows: To Pittsburg and river tipples, 3,979 cars; to points west of Pittsburg, 4,709 cars; to points east of Connellsville, 1,368 cars. This was an increase of 433 cars compared with the shipments of the previous week.

Foreign Coal Trade. Jan. 21.

Export trade here is necessarily quiet, short supplies for the home trade preventing any extension of foreign business.

Imports continue, though at a reduced rate. There is still a good deal of inquiry at Welsh ports, but no new contracts are noted. The abolition of the duty on anthracite and the suspension of that on bituminous coal are not likely to have any immediate effect on the trade.

Receipts of coal at Hamburg, Germany, from foreign countries in 1902 were 2,803,349 tons, of which 2,792,822 tons were from Great Britain and 10,525 tons from the United States. The imports from Great Britain showed an increase of 101,032 tons, while those from the United States showed a decrease of 3,551 tons.

The exports of coal and coke from Great Britain for the full year 1902 were as follows:

	1901.	1902.	Changes.
Coal	41,877,081	43,160,143	I. 1,283,062
Coke	807,671	687,548	D. 120,123
Briquettes	1,081,160	1,050,256	D. 30,904
Totals	43,765,912	44,897,947	I. 1,132,035

In addition to the exports noted above there were 15,148,015 tons of coal shipped abroad for use of steamers engaged in the foreign trade, against 13,586,833 tons in 1901, showing an increase of 1,561,182 tons last year.

Messrs. Hull, Blyth & Company, of London and Cardiff, report under date of January 10 that the general tone of the Welsh coal market remains unchanged and prices are well maintained for all descriptions of coal. Quotations are: Best Welsh steam coal, $3.72@$3.78; seconds, $3.66; thirds, $3.54; dry coals, $3.48; best Monmouthshire, $3.36@3.48; seconds, $3.30; best small steam coal, $2.40; seconds, $2.28; other sorts, $2.04.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The general tone of the freight market continues steady, with a further improvement in Mediterranean rates. Chartering is fairly active. Some rates quoted from Cardiff are: Marseilles, $1.40; Genoa, $1.50; Naples, $1.44; Singapore, $2.52; Las Palmas, $1.50; St. Vincent, $1.62; Rio Janeiro, $2.40; Santos, $2.62; Buenos Aires, $1.86.

IRON TRADE REVIEW.

New York, Jan. 21.

The pressure for foundry iron this week is less marked, although there is still a considerable demand. Southern iron has been rather a feature, especially in the Western markets, and buying for the second half of the year is now going on quite actively in Birmingham. There have also been considerable transactions in steel billets in Pittsburg, as shown in our local letter. In finished material the principal features have been local demands for iron and steel bars and a call for structural steel to fill small orders for builders.

The railroad situation in the West continues serious. On some roads embargoes have been placed on a portion of the traffic while coal and coke have been given the right of way. In the Pittsburg District, Connellsville coke is being held for furnaces controlled by the United States Steel Corporation and it is very difficult to get coke through to points west of Pittsburg. In many quarters furnaces are compelled to bank or reduce their production owing to want of fuel.

Exports of pig iron from Great Britain to the United States in 1902 reached a total of 504,252 tons, against 44,282 tons in 1901, showing an increase of 459,970 tons last year. Exports of steel billets were 51,816 tons, against 13,776 tons in 1901; an increase of 38,040 tons. Moreover, there were 17,406 tons of steel rails sent to the United States in 1902, against 42 tons only in the previous year.

Exports of pig iron from Germany for the 11 months ending November 30 were 310,415 metric tons, against 131,050 tons in 1901; an increase of 179,365 tons, which was chiefly due to shipments to the United States.

rmingham. Jan. 19.

(*From Our Special Correspondent.*)

During the past week the Southern Iron Committee met in Birmingham and heard the request of the Southern iron producers, asking that they be given further protection at old rates on shipments which should have been made before the conclusion of the past year, but for some reasons, partly the shortness of equipment on the part of the railroads, so claimed, are still to be delivered. The request was not granted, the railroad officials believing that they were entitled to some of the great prosperity. As to an advance of 50c. per ton on pig iron, no action was taken, but the matter will be discussed at a meeting to be held next month in Atlanta, Ga. The weight of a ton was reduced from 2,268 to 2,240 lbs. and wrought iron was placed in the same class as manufactured iron.

During the past week official announcement was made by the Tennessee Coal, Iron and Railroad Company that a new furnace would be built by them this year at Ensley, where the company already has five furnaces, all of them in operation. The new furnace will be one of the largest in the South. Work is to be started just as soon as the material can be assembled. The steel plant at Ensley belonging to the Tennessee Company has been undergoing improvements for some time and more money will be spent at that plant. Don H. Bacon, president of the company, arrived in the Birmingham District last week and is looking over the properties of the company.

The report of the Southern Iron Committee for the last month of the past year has been issued and shows that the six districts in the Southern producing territory shipped 190,968 tons of pig iron, steel and cast-iron pipe in December. Of this amount 180,767 tons were pig iron and steel, and 10,201 tons of cast-iron pipe. The Birmingham District sent out last month 91,184 tons of pig iron and steel and 5,053 tons of cast-iron pipe. The report for the entire year of shipments from the Southern producing territory is now being made up. The following is the estimate, only a slight change to be made, for the past year's shipments: Pig iron and steel from all six districts, Anniston, Birmingham, Chattanooga, Sheffield, Nashville and Middlesboro, 1,801,800 tons; cast-iron pipe shipments from all districts, 167,466 tons; grand total shipments, 1,969,266 tons. The latter figure will hardly be changed by the official figures (which will be given out this week) more than 3,000 tons one way or the other. The Birmingham District figures will approximate 921,889 tons pig iron and steel and 82,150 cast-iron pipe.

The following prices prevail: No. 1 foundry, $21@22; No. 2 foundry, $20@21; No. 3 foundry, $18.50@19; No. 4 foundry, $17@18; gray forge, $15.50@16.50; No. 1 soft, $21@22; No. 2 soft, $20@21.

Furnacemen say that they expect the minimum price of $18.50 for No. 2 foundry to hold good for the last half of the year. So far the average price for Nos. 1 and 2 foundry iron has been $20, and while only a few sales have been made, there are prospects that the actual demands are going to be strong enough to warrant a steady market.

Machine shops and foundries in the Birmingham District are still busy. Some big shipments of machinery to Cuba and Mexico have been made recently from this section and other large contracts are on hand. The transient business is good.

Chicago. Jan. 19.

(*From Our Special Correspondent.*)

Sales of pig iron continue to be sluggish; they are mostly in small lots and for delivery as soon as possible. This is largely because of the coke situation, which has shown no sign of improvement for many weeks, and promises nothing but difficulty and high prices for the fuel for many weeks ahead. Foundrymen now appear to be holding off as much as possible for spring, in the expectation that prices of both iron and fuel will be easier then. Southern is quoted at $23.15 for No. 2 and Northern at $23.50 for No. 2, with No. 1 in each case 50c. higher and No. 3 the same amount lower, for corresponding lots as to size and time of delivery. These prices are for deliveries running well into the second half of the year; for immediate delivery—30 to 60 days—there is a premium of $1 to $3 a ton. Most of the business is being done in Southern, which has more to sell than Northern. A few large orders—5,000 tons or more—are reported, but in general business is quiet, too quiet to suit furnace agents.

Coke sells for $9@10, but is difficult to get at any price. It is prophesied by men handling coke largely that the high prices and long famine of supply will result soon in a largely increased supply, through the profit in supplying coke at the present price. To men in the iron business this change seems farther away and too unlikely to be counted upon before the coming of warm weather.

Cleveland. Jan. 20.

(*From Our Special Correspondent.*)

Iron Ore.—The shipment of iron ore from the lake ports to the furnace stock piles has continued briskly and the consumption of it is evidently very heavy. Nothing has been done so far about fixing the prices of iron ore for next year, and it is likely that this important matter will be postponed until the end of February. The Lake rates of carriage will be fixed after the sales have been made.

Pig Iron.—The buying of foundry iron for quick shipment has been the feature of the market during the past week, as the price has gone up on No. 2 to $24.50@$25, Valley furnace, with the material very decidedly limited in quantity and with the only hope of some of the consumers lying in the Southern supply, which is also limited. The material for the first half has about been sold up, but the needs have not all been cared for. Some few contracts for first half delivery are made on the basis of $23, Valley furnace. The buying of foundry for second half delivery has started quite briskly and the market is beginning to be strong. The selling started late, but it is going now with a rush. The price remains stable at $21, alley furnace. Southern iron is bringing $19.50@$20, Birmingham. The selling of bessemer to the United States Steel Corporation is still a matter of the future. The Corporation is holding off, having received the prices, until there is some change in the market. The basic producers are in the same plight. They are making a little off iron, but have very little standard to sell for the first half and no bids for material for the second half. Bessemer is bringing $23, Valley furnace, for first half, off basic $20@$21, and standard basic $21@$22. The coke supply is somewhat better because of the placing of embargoes on the movement of general freight to assist in the coal and coke situation.

Finished Material.—The rail market has been stronger this week, starting off with a sale by one of the Pittsburg mills of 1,500 tons to the Lake Shore Railroad. Inquiries have also been received for other quantities which aggregate a good tonnage. The bidding for bars, both iron and steel, has been better. Bar iron is still wavering in price with sales made at three prices, but it might be said that 1.70c. Pittsburg is representative. Bar steel is in good demand, with prices holding up well. The old quotations prevail. They are 1.60c. Pittsburg, for bessemer, and 1.70c., Pittsburg, for open-hearth. Sheets continue to be weak, with no change in the price, although the smaller consumers are bidding under the larger mills for business. The prices are based on 3.10@3.25c. for No. 27 black sheets out of stock. The structural trade has been lively, with buying both in the smaller and the larger mills good. The premium business of the smaller mills is healthy and some of the larger mills are even bidding for premium business and are getting some of it. They offer deliveries in four weeks. The prices range about as they have been: 1.60c., Pittsburg, from the large mills; 1.75@1.85c. for the output of the smaller mills; and 2.25c. out of stock. Plates have also sold well, but with the greater part of the activity in specifications on old orders, which seem to be heavier than the contracts at first called for. The smaller mills are also getting premium business. The prices do not change from 2c. at the mills for premium material and 1.60c., Pittsburg, for the output of the larger concerns. The billet trade has also been active and this week saw a bid made here by some of the Southern mills for business. One order of 2,000 tons of sheet bars was placed.

Philadelphia. Jan. 21.

(*From Our Special Correspondent.*)

Pig iron agents have had their opinions strengthened by recent movements that pig iron will probably command slightly higher prices after February 1. Consumers have been keeping quiet awaiting developments which many of them anticipated would show a weakness in foundry iron particularly. This weakness has not shown itself, but, on the contrary, the appearance of inquiries for considerable foundry as well as forge iron has shown to furnace people that the advantages are still on their side as regards prices. No changes in quotations have been made and the few transactions reported up to to-day show that the highest prices are being named. A number of mill owners have recently decided to close contracts for forge iron, but the quotations have not been given. No. 1 foundry is very strong and those who have recently bought have been obliged to take grades which they did not care for. There is no prospect of help from Southern furnaces and our home furnaces are not doing anything to pave the way for the closing of contracts. A little charcoal iron has been sold, but it cuts no figure.

Steel Billets.—It is reported here that there is considerable activity in billets here in the West, but there are no signs of business in this territory. The quotations offered are somewhere under $30 at mill.

Merchant Bar.—The retail dealers throughout Eastern Pennsylvania are reporting quite a spurt of demand and are selling both common and refined free of the slight concessions which were made in December.

Merchant Steel.—The rumor is afloat that certain grades of merchant steel are to be advanced for prompt delivery. The situation, however, is not altogether clear.

Sheets.—The only activity noticeable this week has been for light sheets for urgent buyers.

Tubes.—Quotations are held at the top point at mills and business recently booked is very gratifying.

Structural Material.—Quite a good volume of business made up of small orders and eastern Pennsylvania delivery has been taken care of this week.

Steel Rails.—Steel rail orders are coming along satisfactorily and importers say that much ordering will be done for foreign rails.

Pittsburg. Jan. 20.

(*From Our Special Correspondent.*)

Some fair sales of pig iron have been made during the week at higher prices than have ruled. A slightly advanced quotation is made this week for future delivery on all grades and for immediate shipment the rate asked is the highest quoted for first quarter iron. An embargo was placed by the Pennsylvania lines west last week on all coke going through the Conway yards and on the Erie road on all shipments for points beyond Levittsburg, O. This completely cut off deliveries of Connellsville coke to the furnaces in the Valleys and to western points. As a result, the furnaces were badly crippled during the last days of the week and for the first time in several weeks some of the furnaces in the Pittsburg District were affected, but not seriously. The embargo was removed yesterday and coke given the right of way. This likely will have the effect of putting all the Valley furnaces in operation before the end of the week. However, there is no certainty as to railroad shipments. A scarcity of coal, due to the inability of the railroads to handle the prod-

uct required to keep the mills going, curtailed the production of finished steel last week. The congestion on the Pittsburg & Lake Erie Railroad was entirely relieved to-day, and the situation on the Baltimore & Ohio road is much better. The mines along these lines to-day have all the empty cars they need, but it is doubtful if this condition of affairs will continue for any length of time.

Conditions are very satisfactory in the finished steel lines. It is reported that contracts for steel bars aggregating fully 50,000 tons have been placed so far this year by agricultural concerns. For business extending throughout the year the base price of 1.60c. is made. The rush for structural material continues and despite the fact that deliveries cannot be guaranteed within six months or more, some good orders are being booked. The business of the past week amounted to about 15,000 tons. The plate market also is active and new orders are being received by the mills in this district daily. There is a fair demand for steel hoops and for all finished lines of steel. In sheets the demand shows an improvement, but prices remain low and a number of combine mills are still closed. With but few exceptions the independent manufacturers are out of the market. The Follansbee Brothers Company, of this city, has ordered stopped the work of construction on its new tin-plate and sheet mills which were being built at Mahon Station, W. Va. It is reported that the enterprise has been abandoned through the purchase of the property by the United States Steel Corporation. The movements of the committee appointed by the independent sheet and tin plate manufacturers to prepare plans to solve the problem for protection of their interests are being carefully kept secret. So far none of the local mills have entered into the movement. The wire trade is in excellent shape and a great deal of new business is being booked, as another advance in prices is expected. The returns from the bi-monthly examination of the sales sheets of the Republic Iron and Steel Company last week caused a surprise when it was shown that the average price of the sales for the last two months of the year was 1.70c. This has had the effect of greatly strengthening the bar iron market. Last January large contracts for delivery throughout the year were made at 1.50c., and consumers expected a continuation of this rate upon the expiration of the contracts. An average of 1.70c. indicates that a large business was done in the last months of the year at a higher price.

Pig Iron.—About 10,000 tons of bessemer pig iron were sold at prices ranging from $21.50 to $22.50, Valley furnace, the latter price being for delivery within three months. Some third-quarter iron has been sold at $21.50, but it was included in a large order, part of which is for shipment during the second quarter. About 2,500 tons of gray forge sold during the week at $21@21.50, Pittsburg. Foundry iron is very firm, the minimum price for No. 2 grade being $22.50, Pittsburg, and as high as $24 has been paid. The sales for the week aggregate 7,500 tons. Basic iron is quiet, and is quoted at $22, Valley furnace.

Steel.—About 15,000 tons of Bessemer steel billets were sold at $30, Pittsburg, and 25,000 tons of open-hearth steel billets sold during the week at $31@32, delivered at Pittsburg. There is no demand for sheet bars, except at prices which cannot be secured. There is a good demand for tank plate and about 10,000 tons sold at 1.60c. for extended future delivery. Steel bars remain at 1.60c.

Sheets.—The market is in better shape this week, but prices are unchanged. The leading interest continues to quote No. 28 gauge black sheets at 2.75c., and galvanized sheets at 75, 10, and 5 per cent off.

Ferro-manganese.—There is no change in the market, the foreign product being quoted at $50@$51.50.

New York Jan. 22.

Pig Iron.—Demand shows a slight improvement, though buying is still largely for immediate needs. We quote for 1903 delivery, Northern irons at tidewater: No. 1X foundry, $24.50@$25; No. 2X, $22.75@$23.25; No. 2 plain, $21.50@$22. For Southern iron on dock, New York, No. 1 foundry, $24.50@$25.25; No. 2, $23.75; No. 3, $22.50. Middlesboro No. 3 pig is quoted at $18.50 in large lots, but for small lots and spot delivery, $20 is obtained.

Bar Iron and Steel.—We quote for large lots on dock: Refined bars, 2@2.05c.; common, 1.90@1.95c.; soft steel bars, 2@2.10c.

Plates.—Some large consumers are in the market, including the Standard Oil Company. We quote for tidewater delivery in car-loads: Tank, ¼-in. and heavier, 2.09@2.15c.; flange, 2.24@2.30c.; marine, 2.34@2.40c.; universal, 2.05@2.15c.

Steel Rails.—Standard sections are still quoted at $28, f. o. b. mills for 1903 delivery; light rails, $30@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material.—More new orders are noted. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c. For small lots and prompt delivery premiums are paid.

Cartagena, Spain. Jan. 3.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—The exports for the closing days of the year included 2,700 tons of manganiferous ore and 6,800 tons of dry ore, all to Great Britain. Shipments from Cartagena in 1902 were 365,000 tons, an increase of 26,119 tons over 1901. Of the shipments last year, 159,713 tons were consigned by Messrs. Barrington & Holt. There was a falling-off in the ore sent to the United States, but on the other hand, a new market was opened in Nova Scotia, to which, so far, about 10,000 tons have gone.

The new year opens with the iron market quiet, but with prices very firm, and the general tendency is upwards.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 3d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 11s. 3d. per ton.

CHEMICALS AND MINERALS.

New York, Jan. 21.

Business in seasonably good in most branches of trade, but the congestion of cars on the main-line railroads is interfering with deliveries.

Prices of manufactured products continue low, but raw materials are firmer. Finished products are necessarily cheaper, owing to the growing use of electricity in manufacturing. In England chloride of zinc is now being made at leading works by an electrolytic process.

Our import trade is quiet, but more attention is being given to exports. Last month New York alone exported $42,269 worth of zinc dross to England; 31,928 lbs. pot and pearl ashes, of which Germany took 25,500 lbs.; $3,510 worth of asphalt to Brazil; $13,925 worth of acids, principally to South America and the West Indies; $1,093 worth of asbestos to Germany, $981 to Belgium, $770 to France and $712 to England. Recently we sent 282,400 lbs. talc to Belgium and 40,000 lbs. to Cape Colony.

Hereafter the Jersey Gelatine Works, of Bound Brook, N. J., will sell direct to consumers its liquid anhydrous sulphurous acid, as the Roessler & Hasslacher Chemical Company, of New York, has discontinued the agency for it.

The fire at the Nichols Chemical Company, at Laurel Hill, L. I., was in the blue vitriol plant, belonging to the copper refining works. No damage was done to the sulphuric acid and other chemical works, belonging to the General Chemical Company.

Heavy Chemicals.—Delayed railroad shipments have inconvenienced the trade; but market prices are little influenced thereby, as consumers have enough stock on hand to keep them going for a time. Importers complain of short stocks of prime bleaching powder, and have therefore advanced prices. The exports of bleaching powder from Great Britain in 1902 are shown below, in long tons:

Destination.	1901.	1902.	Changes.
United States	36,310	32,434	D. 3,876
Other countries	16,710	12,649	D. 4,061
Total tons	53,020	45,083	D. 7,937

Exports in 1902 show a decrease of 14.9 per cent, while the United States alone shows a falling off of 10.7 per cent. The average value of the 1902 exports to America was $30.77 per ton, which is $2.74, about 8 per cent, less than 1901, owing to keen competition.

The British imports, particularly from Germany and Belgium, have increased from 12,881 tons in 1901 to 13,353 tons in 1902. The imports in 1902 had an average value of $33.13 per long ton, which is $1.16, or 3 per cent, lower than 1901; but $2.36, or nearly 8 per cent, better than the export price quoted by British manufacturers.

We quote, per 100 lbs., as follows:

	Domestic, Prompt.	F. o. b. works. Futures.	Foreign, Prompt.	F. o. b. New York. Futures.
Alkali, high-test in bags	82½@85c.	72½@75c.	90@92½c.	.....
Caustic soda, high-test in bags	$1.90@$1.95	$1.65@$1.70	$1.90@$2.00	.....
Bicarb. soda, ordinary	$1.25	.....	$1.50@$1.60	.....
Bicarb. soda, extra	$3.00	.....	.....	.....
Sal soda	60c.	.....	67½c.	.....
Chlorate of potash	$7⅝@$7⅞	$7@$7½	$7½@$8	$7@$7¼
Bleaching powder, per quality	.....	$1@$1.15	$1.37½@$1.75	$1.25@$1.35

Cyanide of Potassium.—Notably weak, owing to the heavy stocks abroad and the slow recovery in demand. Importers quote up to 22c. per lb., but large consumers can doubtless place orders at 20c. or less. In the British markets 9½d. (19c.) is the f. o. b. price, but this is probably shaded on substantial contracts. Recently there was shipped to Mexico through New York 6,720 lbs. This quantity had an average value of about 21c., which very likely included, besides cost, the expenses incurred in making the shipment.

Paris Green.—Some of the producers show a tendency to formulate a gentlemen's agreement to maintain prices; but several of the more important makers are obdurate. All, however, can well remember the unsuccessful attempt a few years ago to regulate the market and keep prices at a higher level than consumers cared to recognize. At that time 4 prominent concerns united and raised prices to 16½c. per lb., in kegs, while white arsenic stood around 4½c. Soon, however, independent makers forced the price down to 9c., although arsenic remained around 4c. Now paris green sells up to 11½c., and white arsenic can be had as low as 2⅝c. In other words, the difference between the cost of raw material and the manufactured product is greater than it was during the reign of the combination. Of course the expense of manufacturing has been enhanced by dear fuel, but this condition is only temporary. Therefore, it seems unwise to attempt another combination, unless all the important manufacturers join.

Acids.—Quiet. Blue vitriol is firmer, as the domestic makers are again sure of their position, as importers are unwilling to book orders while the foreign market advances. Recently, however, 607 tons of British copper sulphate arrived at San Francisco.

The British exports of copper sulphate in 1902 show an increase of fully 20 per cent. over 1901, being 43,289 long tons, against 36,025 tons; but the value has fallen considerably. Competition, coupled with a low metal market, undoubtedly accounts for the slump in copper sulphate prices; but with the opening of the new year, the situation has improved somewhat. In 1902 the exports averaged about $96.58 per long ton, which, compared with 1901, is a decrease of $26.43, or over 21 per cent, in value. It is interesting to remark that the British article has been valued at fully $7 per ton more than the American in 1902. On the other hand, however, the falling off in British values has been about $10 more than the American, which latter depreciated only 15.5 per cent., as against the former's 21 per cent. But the American export trade has suffered a heavy loss, and, in November and December, found the British article competing in the domestic market.

Copper sulphate exports through New York, the leading port, in the year 1902 were as below, comparison being made with 1901, in lbs.:

	1901.	1902.	Changes.
Austria	3,653,016	3,698,574	I. 45,558
France	1,857,731	1,088,264	D. 769,467
Ger. & Holland	1,461,416	1,941,825	I. 480,409
Great Britain	181,840	.....	D. 181,840
Italy	27,499,645	14,705,146	D.12,794,499
Portugal	1,263,123	24,940	D. 1,238,183
Other countries	559,229	1,280,200	I. 720,971
Total, Europe	36,476,000	22,738,949	D.13,737,051
Africa (French)	164,943	169,172	I. 4,229
Australia	2,420	.....	D. 2,420
Canada	14,426	.....	D. 14,426
Cen. & So. Am.	553,406	598,693	I. 45,287
Mexico	309,727	116,486	D. 193,241
West Indies	41,953	35,290	D. 6,663
Grand total	37,562,875	23,658,590	D.13,904,285
Value	$1,767,087	$947,926	D. $819,161

The falling off in exports in 1902 was equal to 37 per cent in quantity, owing chiefly to the smaller demand from Italy.

It is interesting to note that our exports to the newer markets, notably Greece, are growing, this country having taken 814,365 lbs., as against 7,462 lbs. only in 1901. Our British trade fell off with the entrance of importers into the American market, which has caused keen competition on this side. Since the first of the new year, however, this rivalry has been checked by the higher prices abroad.

The unique natural copper sulphate deposits, near Huatacondo, in Tarapaca, Chile, are to be worked on an extensive scale by the Copaquire Copper Sulphate Company, Limited, capitalized at £300,000 ($1,500,000). The deposits are believed to contain over 5,000,000 tons of mineral containing soluble copper averaging from 2 to 2½ per cent. metal. The company is operating a small plant, erected by the vendors, but the quantity of copper produced is limited.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

Blue Vitriol	$4.30@$4.50	Oxalic com'l	$5.25@$5.50
Muriatic, 18°	1.50	Sulphuric, 50°,	
Muriatic, 20°	1.60	bulk, ton	13.50@15.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.37½	Sulphuric, 60°,	
Nitric, 38°	4.75	bulk	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°,	1.20
Nitric, 42°	5.37½	bulk	21.00@23.00

Brimstone.—Arrivals have been more frequent recently, but as the cargoes are mostly under contract to consumers, comparatively little is obtainable on spot.

Best unmixed seconds have sold ex-steamer at $23.25@$23.50 per ton, while shipments continue at $22.50@$22.75. Best thirds are from $1.75@$2 less than seconds.

Brimstone imports into Great Britain in 1902 were 23,488 long tons, against 22,087 tons in 1901; showing an increase of 1,401 tons, or 6 per cent. The bulk of this Sicilian brimstone has been refined by the Chance process.

Pyrites.—Soon several steamers will arrive at Atlantic ports from Spain. Ocean freight rates are variable, though firm.

Pyrites imports into Great Britain in 1902, chiefly from Spain, were as below, an approximation of the sulphur contents being added, in long tons:

	1901.	1902.	Changes.
Pyrites	653,584	611,159	D. 42,425
Sulphur content	307,184	287,245	D. 19,939

The average value of the pyrites imported in 1902 was $8.15, or 43c. per ton less than 1901. Estimating on this basis the average value of the sulphur contained in the pyrites was $17.36 per ton in 1902, which is somewhat lower than 1901, and considerably less than the selling price of crude Sicilian brimstone. Besides the copper and iron obtained as by-products in burning the pyrites yielded some profit when marketed, thus reducing the actual cost of the sulphur.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, $5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, $5, and fines, $4.75. Spanish pyrites, lump, 12½@13½c.; fines, 10½@11½c. per unit, New York and other Atlantic ports. Spanish pyrites contain from 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—The *Condor* has arrived at New York with 22,800 bags, and the *Longships* at Baltimore with 42,450 bags. A number of sailing vessels are on the way. Ocean freight rates are easier at 15s. ($3.60). Spot nitrate of soda is quoted at $1.97½@$2 per 100 lbs., while shipments are worth from $1.85 to $1.95, according to position. Importers anticipate a better demand next month when fertilizer manufacturers will be in the market. Recently the *General De Negrier* arrived at San Francisco with 3,066 tons, consigned to W. R. Grace & Co.

We learn that the exports of Peruvian guano to Europe in 1902 amounted to 49,000 long tons, showing an increase of 7,000 tons over 1901.

The visible supply of nitrate of soda in Europe on January 1, 1903, was 664,410 long tons, which, compared with the same day in 1902, shows an increase of 49,800 tons, or about 8 per cent.

Concerning the Chilean nitrate of soda market, Messrs. Jackson Brothers, of Valparaiso, write us as follows under date of December 13: Transactions during the fortnight have been large, principally in monthly parcels for both qualities, extending over next year. Sales of 95 per cent have been effected for December and January 1 at 6s. 7½d.@6s. 8d.; for February 1, up to 6s. 6d. has been paid; April to December, monthly lots, fetched 6s. 2d. @ 6s. 3d. Refined has been sold at 6s. 8½d. for December, 6s. 5½d. for April to May, and 6s. 4d. @ 6s. 5½d. for April to December deliveries, all alongside terms. The amount of disposable nitrate for December to January is very limited, so that producers show little disposition to operate except at an advance even for future deliveries. Exports for the 11 months to November 30, 1902, amounted to 26,762,000 qtls., against 25,029,000 qtls. in the corresponding period of 1901. We quote: 95 per cent, December to January, 6s. 8d.; January 15, 6s. 7½d.; February, 6s. 6d., and 96 per cent, December to January, 6s. 8½d., all ordinary terms, sellers. The price of 6s. 8d. with an all round freight of 16s. 3d., stands in 8s. 2¾d. per cwt., net cost and freight, without purchasing commission. Reported sales are: 1,136,500 qtls., and resales, 512,500 qtls.

Sulphate of Ammonia.—Stronger, as the foreign market is higher, and agriculturists are buying more freely. Spot nominal at $3.05 per 100 lbs. for domestic and $3.10 for foreign, while shipments range from $3.12@$3.15, as to seller.

Saltpeter.—An increased consumption by fertilizer manufacturers principally, coupled with a light visible supply has strengthened the market materially. Crude on spot has advanced to $3.75 per 100 lbs., while shipments have been quoted up to $3.60. Refined continues unchanged at $4.25@$4.62½ per 100 lbs. The primary markets, however, are lower and do not indicate an advance, which makes it seem that the American market is in the hands of speculators.

Phosphates.—Bad weather is interfering with production at the Tennessee mines. To keep their laborers employed the larger Mt. Pleasant companies have transferred them to the shipping departments. Stocks are small and estimates are as low as 10,000 tons, but it is believed they amount to about 15,000 or 18,000 tons. Still with the present heavy shipping stock piles in this field will be depleted when mining begins in the spring. It is feared that not enough labor will be found to keep production up to the demand. There may also be a scarcity of cars to ship the rock. Undoubtedly this will be a very active year. In Florida shipments are large. A charter is noted from Port Inglis to Helsingborg, Sweden, at 14s. 6d. ($3.48), sailing on January 31. This rate is normal, though it indicates a firm freight market. South Carolina shows a moderate demand at unchanged prices.

It is interesting to note that we are frequently exporting superphosphates. Last year several lots were sent abroad through Pensacola, Fla., and recently 100 bags went to Nova Scotia from Boston. We also notice that 1,066 tons of phosphates were shipped last month to the French West Indies from New York.

Completed statistics show that Great Britain imported in 1902 phosphate rock to the amount of 364,859 long tons. This quantity is 9,969 tons, or 2.6 per cent, more than was reported in 1901. The bulk of these phosphates came from Africa, though a good quantity has been received from America, principally from Florida.

Phosphates.	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton
*Fla. hard rock (78@80%)	$6.00@$6.50	6@6⅜d.	$9.48@10.07
*Fla. land peb. (68@73%)	3.00@ 3.25	4⅝@5d.	6.65@ 7.00
†Tenn., (78@82%) export	3.25@ 3.50	5½@6d.	8.58@ 9.36
†Tenn., 78% domestic	3.00	.....	.....
†Tenn., 75% domestic	2.75@ 3.00	.....	.....
†Tenn., 73@74% domestic	2.30@ 2.40	.....	.....
†Tenn., 70@72% domestic	2.10@ 2.25	.....	.....
‡So. Car. land rock	@ 3.25	4⅛@4⅝d.	5.67@ 5.98
‡So. Car. river rock	2.75@ 3.00	.....	.....
Algerian (63@68%)	.....	4¾@4⅞d.	6.18@6.34
Algerian (58@63%)	.....	4⅛@4⅝d.	5.40@5.55
Algerian (53@58%)	.....	4⅜@4½d.	4.90@5.04

*Fernandina, Brunswick or Savannah.
†Mt. Pleasant. ‡On vessels, Ashley River.

Liverpool. Jan. 7.

(*Special Report of Joseph P. Brunner & Co.*)

The market for chemicals is steady generally and a fair volume of business is reported.

Soda Ash.—Nearest range for tierces may be called about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton net cash. Bags, 5s. per ton under price for tierces.

Caustic Soda.—We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for Continental points and a few other export quarters.

Bleaching Powder.—Makers are busy with deliveries on contracts. Outside of contract deliveries there is not much doing and for hardwood £4 5s@£4 10s. per ton may be called about nearest range as to market.

Chlorate of Potash.—Prices are nominal at about 2⅝@2¾d. per lb., net cash.

Bicarb. Soda.—Unchanged at £6 15s. per ton, less 2½ per cent for the finest quality in 1 cwt. kegs, with usual allowances for larger packages; also special quotations for a few favored markets.

Sulphate of Ammonia.—Strong and dearer at £12 7s. 6d.@£12 10s. per ton, less 2½ per cent for good gray 24@25 per cent, in double bags, f.o.b. here.

Nitrate of Soda.—A shade dearer for the best quality, holders quoting £9 5s.@£9 10s. per ton for double bags, f.o.b. here, as to quality.

METAL MARKET.

New York, January 21.

Gold and Silver Exports and Imports.

At all United States Ports in December and Year.

Metal	December. 1901.	December. 1902.	Year. 1901.	Year. 1902.
Gold:				
Exports	$4,744,123	$2,853,097	$57,783,939	$36,030,576
Imports	2,791,522	2,150,087	54,761,880	44,162,767
Excess.	E. $1,952,601	E. $697,010	E. $3,022,059	I. $8,132,119
Silver:				
Exports	$4,723,439	$5,546,875	$55,638,358	$49,272,964
Imports	2,788,590	2,701,286	31,146,782	26,402,935
Excess.	E. $1,934,849	E. $2,845,589	E. $24,491,576	E. $22,870,019

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending January 20, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week	$2,705	$48,557	$409,926	$54,505	E. $309,569
1903	20,905	583,629	1,012,436	105,362	E. 344,350
1902	1,917,404	50,927	2,906,963	93,782	E. 4,682,158
1901	5,753,916	216,982	2,560,385	242,634	E. 7,854,685

Imports were from Central and South America; exports chiefly to Europe.

Financial Notes of the Week.

There is little new in the general position of trade. Gold exports continue to be talked about, but nothing has been done in that direction.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending January 17, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$830,873,400	$867,529,100	$886,054,100
Deposits	921,787,200	938,722,200	901,111,900
Circulation	30,973,200	31,995,600	45,500,300
Specie	184,652,800	177,165,300	168,241,400
Legal tenders	73,050,600	76,576,700	77,253,700
Total reserve	$257,703,400	$253,742,000	$245,495,100
Legal requirements	230,446,800	234,680,550	225,277,975
Balance surplus	$27,256,600	$19,061,450	$20,217,125

Changes for the week, this year, were increases of $14,412,000 in loans and discounts, $27,502,300 in deposits, $11,692,400 in specie, $590,000 in legal tenders, and $5,406,825 in surplus reserve; a decrease of $138,800 in circulation.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings on the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd	$177,165,300	.....	$168,241,400	.....
England	174,885,150	.....	161,137,195	.....
France	487,884,615	$219,004,775	501,170,835	$218,714,810
Germany	175,285,000	64,835,000	165,400,000	61,175,000
Spain	70,125,000	87,005,000	71,965,000	98,600,000
Neth'l'ds	28,673,000	31,376,000	23,494,500	32,861,500
Belgium	15,683,335	7,841,665	15,736,665	7,868,335
Italy	80,500,000	10,312,500	84,660,000	10,403,000
Russia	341,245,000	30,920,000	382,865,000	34,065,000

The returns of the Associated Banks of New York are of date January 17 and the others January 16, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has shown no special life. Orders have been moderate and tendency at present is towards dullness, until some inquiry beyond the average stimulates the price.

The United States Assay Office in New York reports receipts of 66,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to January 8 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India	£250,220	£192,500	D. £57,720
China	.....	.....	.....
The Straits	.....	.....	.....
Totals	£250,220	£192,500	D. £57,720

Receipts for the week were £252,000 in bar silver from New York, and £14,000 from the West Indies; total, £266,000. Shipments were £168,500 in bar silver to Bombay, and £24,000 to Calcutta; total, £192,500.

Indian exchange continues strong, all the Council bills offered in London being taken at 16.03d. per rupee. The shipments of silver to India are still light.

Merchandise exports from the United States in December were the largest of the year, being valued at $148,006,823, or $11,065,284 more than in December, 1901. For the full year the statement of the Bureau of Statistics of the Treasury Department is as follows:

	1901.	1902.
Exports	$1,465,375,860	$1,360,696,355
Imports	880,419,910	969,270,009
Excess, exports	$584,955,950	$391,426,346
Add excess of exports, silver	....	22,870,019
Total		$414,296,365
Deduct excess of imports, gold		8,132,191
Apparent balance		$406,164,174

The gold and silver movement in detail will be found in the usual place, at the head of this column. The year 1902 showed a decrease of $104,679,505 in exports, and an increase of $88,850,099 in imports; leaving a decrease of $193,529,604 in the balance of exports.

The foreign merchandise trade of Great Britain for the year 1902 is valued by the Board of Trade returns as below:

	1901.	1902.
Imports	£521,990,198	£528,860,284
Exports	347,864,268	349,350,664
Excess, imports	£174,125,930	£179,509,620

This shows an increase of £6,870,086, or 1.3 per cent, in imports; an increase of £1,486,396, or 0.4 per cent, in exports; and a consequent increase of £5,383,690, or

3.1 per cent, in the balance of imports. The gold and silver movement for the year was as follows:

	1901.	1902.	Changes.
Gold:			
Imports	£20,715,628	£21,629,049	I. £913,421
Exports	13,965,265	15,409,088	I. 1,443,823
Excess, imports	£6,750,363	£6,219,961	D. £530,402
Silver:			
Imports	£11,501,678	9,764,296	D. 1,737,382
Exports	12,049,837	10,716,118	D. 1,333,719
Excess, exports	£548,159	£951,822	I. £403,663

Of the silver imported in 1902, there was credited to the United States £8,063,031, or 82.6 per cent of the total.

The foreign merchandise trade of France for the 11 months ending November 30 is valued by the Ministry of Commerce as below:

	1901.	1902.
Imports	Fr. 3,974,030,000	Fr. 4,008,174,000
Exports	3,651,075,000	3,840,490,000
Excess, imports	Fr. 322,955,000	Fr. 167,684,000

This shows for 1902 an increase of 34,144,000 fr. in imports; an increase of 189,415,000 fr. in exports; and a resulting decrease of 155,271,000 in the excess of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.37½	$.39½
Peruvian soles and Chilean pesos	.37	.39
Victoria sovereigns	4.86	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

January.	Sterling Exchange	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb	Copper Electrolytic, Cts per lb.	Copper London, £ per ton.	Tin, Cts. per lb.	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter S. L. Cts. per lb.
15	4.86¼	47¾	22 1/16	12¼ @ 12½	12 @12⅛	53⅛	28¼	4.05 @4.10	4.92½	4.75
16	4.86¼	47⅜	21⅞	12¼ @12⅜	12 @12⅛	53¼	28½	4.05 @4.10	4.92½	4.75
17	4.86¼	47¼	21 13/16	12¼ @ 2⅜	12 @12⅛	....	28½	4.05 @4.10	4.92½	4.75
19	4.86¼	47½	21¾	12¼ @12⅜	12 @12⅛	53	28¾	4.05 @4.10	4.92½ @4.95	4.75
20	4.86¼	47¾	21 13/16	12¼ @12⅜	12 @ 2¼	52⅞	28½	4.05 @4.10	4.92½ @4.95	4.75
21	4.86⅞	47⅛	21¾	12¼ @12½	12 @12¼	52¾	28⅜ @28½	4.05 @4.10	4.92½ @4.95	4.75 @4.77½

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper has ruled very firm throughout the week, and the consumptive demand both here and abroad is reported as being quite satisfactory. The ruling quotations are 12¼@12½c. for Lake; 12@12¼c. for electrolytic in cakes, ingots and wirebars; 11¾@12c. in cathodes; casting copper at 12c.

The market for standard copper in London, which closed last week at £53 5s., opened on Monday at £53, and the closing quotations on Wednesday are cabled as £52 13s. 9d.@£52 15s. for spot; £53@£53 2s. 6d. for three months. At the close there was very good support.

Statistics for the first half of January show an increase in the visible supplies of 100 tons.

Refined and manufactured sorts we quote: English tough, £56 10s.@£57; best selected, £58@£58 10s.; strong sheets, £69 10s.@£70; India sheets, £71@£71 10s.; yellow metal, 6¼@6½d.

Exports of copper from Atlantic ports in the week ending January 20 are reported by our special correspondents as follows: Great Britain, 111 long tons; Germany, 221; Holland, 75; Italy, 65; Belgium, 25; France, 1,121; total, 1,618 tons. Imports were 320 tons copper and 225 tons matte from Mexico, and 109 tons copper from Great Britain.

Copper production, as reported by Mr. John Stanton who acts as statistician for the companies, was as follows for December and the 12 months ending December 31, in long tons (2,240 lbs.) of fine copper:

	—December.— 1901.	1902.	——Year.—— 1901.	1902.
U. S. reporting mines	16,003	23,526	223,355	258,056
U. S. outside sources	3,800	2,300	41,900	37,600
Total U. S. production	19,803	25,826	265,255	295,656
Foreign reporting mines	8,677	9,676	100,241	108,875
Total production	28,480	35,502	365,496	404,531
U. S. exports	10,171	10,032	90,366	168,053

The December production of the United States shows an increase of 529 tons over November, and of 6,023 tons over December, 1901. For the year the United States production increased 30,401 tons, or 11.5 per cent; while that of the foreign reporting mines gained 8,631 tons, or 8.6 per cent. United States exports for December were below the average for 1902; for the year they showed an increase of 77,687 tons, or 86.2 per cent.

Imports and exports of copper in Great Britain for the full year 1902 were as follows, in long tons, the total figures given showing the approximate contents in fine copper:

Imports:	1901.	1902.	Changes.
Copper ore	100,889	88,563	D. 12,326
Matte and precipitate	91,868	73,538	D. 18,330
Fine copper	67,725	90,895	I. 23,170
Totals, fine copper	123,748	136,520	I. 12,772
Exports	46,646	48,548	I. 1,902
Balance	77,102	87,972	I. 10,870

Of the imports in 1902 there was credited to the United States 871 tons ore, 13,956 tons matte, and 41,761 tons fine copper; against 1,027 tons ore, 20,869 tons matte, and 18,957 tons fine copper in 1901.

Imports and exports of copper in Germany for the 11 months ending November 30 were as follows, in metric tons:

	1901.	1902.	Changes.
Imports	54,775	70,226	I. 15,451
Exports	4,653	4,291	D. 362
Balance	50,122	65,935	I. 15,813

This shows an increase of 31.5 per cent in the approximate consumption of foreign copper last year.

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of December 18, that recent sales of bar copper were 9,396 quintals, prices being about $29.80 per quintal in currency; which is equal to $60.25 Chilean gold per 100 kgs., or about 9.97c. per lb. Sales are also reported of 450 tons matte at $12.60 currency per quintal, on a basis of 50 per cent copper. No sales of ore are reported; nominal quotation, $1.67, Chilean currency, per quintal, on a basis of 10 per cent copper.

Tin has again been in fair demand, and values have been well maintained. The market advanced from 28¼c. to 28¾c., but later on declined again, and closes steady at 28⅜@28½c., for both spot and futures.

The foreign market, which closed last week at £128 15s., opened on Monday at £129 12s. 6d.; declined on Tuesday to £129 2s. 6d., and the closing quotations on Wednesday are cabled as £128 5s@£128 7s. 6d. for spot; £128 7s. 6d.@£128 10s. for three months.

Exports of tin from the Straits for the first half of January are cabled as 1,660 long tons, against 1,860 tons for the corresponding period in 1902.

Imports of tin into Great Britain for the year 1902 are reported as below, in long tons, with the re-exports:

	1901.	1902.	Changes.
Straits	26,427	27,592	I. 1,165
Australia	3,165	3,234	I. 69
Other countries	5,805	4,323	D. 1,482
Total	35,397	35,149	D. 248
Re-exports	20,936	22,976	I 2,040
Balance	14,461	12,173	D. 2,288

The tin reported from other countries is chiefly Bolivian tin. The decrease in the balance retained for consumption is largely due to the decline in the tinplate trade.

Lead is quiet and unchanged. The ruling quotations are 3.95@4.05c., St. Louis; 4.05@4.10c., New York.

The foreign market again displayed considerable strength, Spanish lead being quoted at £11 10s.@£11 11s. 3d.; English lead 2s. 6d. higher.

Imports of lead into Great Britain, with exports of the metal, are reported as below for the full year, in long tons:

Imports:	1901.	1902.	Changes.
United States	43,496	50,821	I. 7,325
Spain	99,147	104,277	I. 5,130
Australia	60,609	58,778	D. 1,831
Other countries	14,808	17,942	I. 3,134
Total imports	218,060	231,818	I. 13,758
Exports	37,575	33,070	D. 4,505
Balance	180,485	198,748	I. 18,263

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraph us as follows: Lead is dull. Quotations are 3.97½c. for Missouri brands and 4.05c. for desilverized lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of January 3, that the price of silver for the week has been 12 reales per ounce; exchange has gone up by 10 centimos, making it 34 pesetas to £1. Local quotation for pig lead on wharf has been 58.25 reales per quintal, which on current exchange is equal to £9 10s. 7d. per long ton, f. o. b. shipping port. Exports of pig lead for the week were 508,000 kgs. to Marseilles.

Spelter continues very firm indeed and values are being well maintained. The consumptive demand remains very good. The ruling quotations are 4.75@4.77½c., St. Louis; 4.92½@4.95c,, New York.

The foreign market is also very firm, good ordinaries are being quoted at £20 2s. 6d., specials at £20 7s. 6d.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter continues strong, but is rather quiet at the late advance. Prices are nominally 4.70@4.75c., East St. Louis.

Imports of pelter, or metallic zinc, into Great Britain for the year 1902 were 88,276 long tons, against 67,552 tons in 1901; an increase of 20,724 tons, or 30.5 per cent, last year.

Exports of spelter from Germany for the 11 months ending November 30 were 62,969 metric tons, against 46,669 tons in 1901; an increase of 16,300 tons, or 34.8 per cent, last year.

Antimony is dull, without any special feature. We quote: Cookson's at 8¼@8½c.; Hallett's, 7@7⅛c.; Hungarian, Italian, French, Japanese and U. S. at 6¾@6⅞c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per grain.

Quicksilver.—The New York quotation is $48 per flask for large lots, with a slightly higher price asked for smaller quantities. In San Francisco, prices continue at $45.50@$46.50 per flask for domestic orders, while for export $43.50@$44 is quoted. The London quotation has been reduced 2s. 6d. this week, and is now £8 12s. 6d. per flask.

Imports of quicksilver into Great Britain in 1902 were 2,489,382 lbs., against 2,650,572 lbs. in 1901. Reexports were 1,463,937 lbs., against 2,014,753 lbs. in 1901. The balance retained for consumption was 1,025,445 lbs. in 1902, against 635,819 lbs. in 1901; showing an increase of 389,626 lbs. last year.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

	Per lb.
Aluminum, No. 1, 99% ingots	33@37c.
Aluminum, No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	35@39c.
Bismuth	$1.50
Chromium, pure (N.Y.)	80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25%, N. Y.)	55c.
Ferro-Tungsten (87%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.83
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Average Prices of Metals per lb., New York.

Month.	Tin. 1902.	Tin. 1901.	Lead. 1902.	Lead. 1901.	Spelter. 1902.	Spelter. 1901.
January	28.84	26.51	4.060	4.350	4.27	4.13
February	24.07	26.68	4.075	4.350	4.15	4.01
March	26.32	26.03	4.075	4.350	4.28	3.91
April	27.77	25.93	4.075	4.350	4.37	3.98
May	29.85	27.12	4.075	4.350	4.47	4.04
June	29.36	28.60	4.075	4.350	4.96	3.99
July	28.58	27.85	4.075	4.350	5.27	3.98
August	28.23	26.78	4.075	4.350	5.44	3.99
September	26.60	25.31	4.075	4.350	5.49	4.06
October	26.07	26.62	4.075	4.350	5.23	4.32
November	25.68	26.67	4.075	4.350	5.18	4.39
December	25.68	24.36	4.075	4.153	4.78	4.31
Year	26.79	26.54	4.069	4.334	4.84	4.02

Average Prices of Copper.

Month.	New York Electrolytic. 1902.	New York Electrolytic. 1901.	New York Lake. 1902.	New York Lake. 1901.	London Standard. 1902.	London Standard. 1901.
January	11.053	16.25	11.322	16.77	48.43	71.78
February	12.173	16.38	12.378	16.90	55.16	71.17
March	11.882	16.42	12.188	16.94	53.39	69.54
April	11.618	16.43	11.986	16.94	52.79	69.61
May	11.856	16.41	12.226	16.94	54.03	69.60
June	12,110	16.38	12.360	16.90	53.93	68.33
July	11.771	16.31	11.923	16.61	52.89	67.60
August	11.404	16.25	11.649	16.50	51.96	66.34
September	11.480	16.25	11.760	16.54	52.68	65.97
October	11.449	16.45	11.722	16.60	52.18	64.11
November	11.288	16.224	11.533	16.33	51.03	64.51
December	11.430	13.845	11.599	14.36	50.95	52.34
Year	11.626	16.117	11.887	16.53	52.46	66.79

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.	1900. London. Pence.	1900. N. Y. Cents.
January	25.62	55.56	28.97	62.82	27.80	59.30
February	25.41	55.09	28.18	61.06	27.40	59.70
March	25.00	54.22	27.04	60.63	27.59	59.81
April	24.84	52.72	27.30	59.29	27.41	59.59
May	22.71	51.31	27.43	59.64	27.56	59.90
June	24.17	52.36	27.42	59.57	27.81	60.42
July	24.38	52.88	26.96	58.46	28.23	61.25
August	24.23	52.52	26.94	58.37	28.13	61.14
September	23.88	51.52	26.95	58.26	28.85	62.63
October	23.40	50.57	26.62	57.50	29.58	63.68
November	22.70	49.07	26.12	56.64	29.06	64.04
December	22.21	48.03	25.46	55.10	29.68	64.14
Year	24.09	52.16	27.11	58.95	28.27	61.33

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Allis-Chalmers, pf.	Feb. 2	1.75	284,375	1,990,625
†Amalgamated Copper	Feb. 24	.50	769,430	20,426,126
*Bartolome de Med., Mex.	Jan. 24	.77	1,540	65,023
*Cinco Senores, Mex.	Jan. 31	3.82	7,640	663,745
Consolidation Coal, Md.	Feb. 2	..	205,000	5,728,000
*Esperanza, Mex.	Jan. 10	3.82	11,460	1,081,539
Greene Con., Mex.	Feb. 2	2.00	144,000	508,000
*Guadalupe, Mex.	Jan. 26	.77	7,700	3,492,650
Montana Ore Purchasing.	Jan. 30	2.00	162,000	2,808,000
†Phila. Nat. Gas, com.	Feb. 2	.75	231,406	2,722,613
*Providencia, Mex.	Jan. 26	.77	4,620	165,120
§Quincy, Mich.	Feb. 16	2.50	250,000	13,820,000
*San Raf., Aviador, Mex.	Jan. 19	4.59	5,508	.....
*San Rafael, Aviado	Jan. 19	3.06	3,672	.....
*Santa Gert. y An., Mex.	Jan. 26	.38½	11,016	.....
*Soledad, Mex.	Jan. 19	1.91	1,834	224,074
†Tenn. Coal, I. & R.R.pf.	Feb. 2	2.00	4,960	287,840
*Trinity Co. Gold, Cal.	Feb. 2	.05	5,000	10,000
†Vindicator Con., Colo.	Jan. 26	.03	33,000	972,000
Vindicator Con., extra	Jan. 26	.02	22,000	.....

*Monthly †Quarterly. §Semi-annual.
Note: Complete list will appear Feb. 7.

ASSESSMENTS.

Name of Company.	Location. No.	Delinq.	Sale.	Amt.
Badger	Ore. ..	Feb. 13	.....	.10
Best & Belcher	Nev. ..	Jan. 30	.....	.15
Bullion Con.	Nev. ..	Feb. 2	.....	.03
Cal. Paint Mg. & M.	Cal. ..	Feb. 12	.....	.08
Challenge Con.	Nev. 35	Feb. 3	Feb. 26	.05
Copper Ranch	Utah ..	Feb. 2	Feb. 20	.00½
Elise	Utah 3	Jan. 12	Jan. 30	.00½
Inyo Marble	Cal. 36	Jan. 3	Feb. 3	.06
Karma	Cal. ..	Feb. 2	.....	.05
Maple Creek	Cal. ..	Feb. 14	.....	.10
Martha Washington	Utah 12	Jan. 27	Feb. 14	.01
Mt. Pleasant Con.	Cal. ..	Jan. 31	.....	.01½
Ophir	Nev. ..	Feb. 4	Feb. 25	.15
Potosi	Nev. ..	Feb. 11	Mar. 4	.05
Seg. Belcher & Mides Con.	Nev. 30	Feb. 2	Feb. 24	.05
South Swansea	Utah 1	Feb. 3	Feb. 21	.03
Tule Bell	Cal. 2	Jan. 15	Feb. 10	.01
Yellow Jacket	Nev. ..	Feb. 11	Mar. 19	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 19. H.	Jan. 19. L.	Jan. 20. H.	Jan. 20. L.	Sales
Acacia, Colo	1	.....	.....	.....	.....	.08	.....	.....	.....	.....	.....	.08½	.....	3,000
Alta, Nev	1	.....	.....	.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Amalgamated c., Mont	100	63.88	63.50	64.13	62.25	63.38	62.88	64.13	63.38	65.13	63.38	64.38	63.13	101400
*Anaconda c., Mont.	25	.....	.....	96	.....	97½	.....	97½	.....	97½	.....	96½	96	1,000
Anacond Gold, Colo.	5	.20	.....	.....	.....	.....	.....	.19	.....	.....	.....	.....	.....	1,500
Belcher, Nev.	3	.90	.....	1.50	.....	.....	.....	.80	.....	.75	.....	.....	.....	1,000
Best & Belcher, Nev.	3	.....	.....	4.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Breece, Colo.	25	.....	.....	.....	.....	.....	.....	.50	.....	.....	.....	.....	.....	20
Brunswick, Cal.	1	.....	.....	.....	.....	.....	.....	.....	.....	.09	.....	.....	.....	200
Chollar, Nev.	3	.....	.....	.....	.....	.70	.65	.....	.....	.....	.....	.....	.....	800
Comstock T., s., Nev.	2	.09	.08½	.10	.09	.10	.....	.09½	.09	.10	.....	.10	.....	137100
Comst T Bonds	100	09	.....	.09	.....	.09	.....	.09	.....	.....	.....	1⅝	.09½	62 500
Con. Cal. & Va., g. s.	2½	2.50	.....	3.10	.....	3.00	.....	2.50	2.10	1.95	1.80	1.85	.....	1,650
Cons. Imperial, Colo.	1	.12	.....	12	.....	12	.....	.....	.....	.....	.....	.....	.....	1,100
Creede & C. C., Colo.	1	.....	.....	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	1,200
Cripple Creek c., Colo.	1	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Crown Point, Nev.	3	.....	.....	.....	.....	.....	.....	.....	.....	.42	.....	.....	.....	100
Daly, Utah	20	.....	.....	.....	.....	1.90	.....	.....	.....	.....	.....	.....	.....	50
Elkton g., Colo.	1	.....	.....	.....	.....	.....	.....	.36	.....	.36	.....	.....	.....	500
Gold Dollar, Colo.	1	.06	.....	.....	.....	.....	.....	.06	.....	.05½	.....	.....	.....	3,000
Gould & Curry, Nev.	3	.....	.....	.....	.....	.....	.....	.80	.....	.75	.....	.....	.....	500
Greene Con., c., Mex.	10	23.38	23.25	23.13	22.00	22.50	22.25	22.63	22.13	24.50	22.25	23.30	22.38	7,900
Hale & Norcross, Nev.	3	.98	.95	1.25	.....	.....	.....	.....	.....	.95	.....	.85	.....	1,800
Isabella, g., Colo.	1	.....	.....	.30	.....	.....	.....	.30	.....	.....	.....	.....	.....	600
Julia, Nev.	1	.09	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Justice Nev.	1	.....	.....	.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Kentucky Con., Nev.	1	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Mexican, Nev.	3	.....	.....	.....	.....	3.00	.....	.....	.....	1.75	.....	.....	.....	300
Mollie Gibson, Colo.	5	.....	.....	.07	.....	.07	.....	.....	.....	.07	.....	.....	.....	2,500
Moon-Anchor, Colo.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Occidental, Nev.	1	.....	.....	.....	.....	2.00	.....	.....	.....	.....	.....	.....	.....	200
Ontario, Utah	100	.....	.....	.....	.....	6.25	.....	.....	.....	.....	.....	6.50	.....	120
Ophir, s., Nev	1	.....	.....	3.20	3.15	.....	.....	.....	.....	2.50	.....	.....	.....	400
Pharmacist, Colo.	1	.....	.....	.....	.....	.06	.....	.06½	.06	.05½	.....	.06½	.....	3,200
Portland, Colo	10	.....	.....	1.80	.....	1.80	.....	.....	.....	1.80	.....	1.85	.....	1,000
Potosi, Nev.	3	.75	.70	.81	.....	1.00	.95	.70	.....	.60	.....	.....	.....	3,200
Quicksilver, Cal.	100	2.85	2.80	2 00	.....	.....	.....	.....	.....	.....	.....	2.75	2.00	500
Savage, Nev.	2½	.78	.75	.95	.....	.....	.....	.95	.....	.....	.....	.....	.....	1,000
Sierra Nevada, Nev.	3	1.80	1.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Tenn. c., Tenn	25	16.00	.....	15.88	.....	15.88	.....	16.50	15.88	.....	.....	16 00	.....	1,700
Union Con., Nev.	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.05	.90	500
Union Cop., N. C.	10	2.50	.....	2.50	.....	2.38	.....	2.63	2.38	2.50	2.38	2.50	.....	1,270
Utah, Nev.	1	.....	.....	.....	.....	.....	.....	.55	.....	.....	.....	.....	.....	200
White Knob, g. s., Ida	100	11.25	.....	11 25	11.13	10.00	.....	11.50	10.88	11.00	10.63	.....	.....	1,42
Yellow Jacket, Nev.	3	.....	.....	.93	.90	.....	.....	.....	.....	.....	.....	.....	.....	60

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 19. H.	Jan. 19. L.	Jan. 20. H.	Jan. 20. L.	Sales.
Adventure Con., c.	$25	100,000	16	.....	17	15⅝	15½	.....	16	.....	15⅞	15	15	14⅝	1,297
Allouez	25	80,000	3⅜	3¼	.....	.....	.....	.....	3⅛	3⅛	3⅜	3⅛	3⅜	3⅛	7,476
Amalgamated, c.	100	1,538,879	63⅝	62⅛	64	62½	63½	62⅝	64¼	63⅜	65	63½	64¼	63	14,983
Am. Gold Dreg.	5	90,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Z. L. & Sm.	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anaconda, c.	25	1,200,000	.....	.....	.....	.....	.....	.....	.....	.....	24	.....	.....	.....	10
Arcadian, c.	25	150,000	4½	4⅜	4¾	4½	4¾	4⅝	4⅛	4⅛	5	4¾	5	4⅝	2,338
Arnold	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic, c.	25	100,000	9	.....	.....	.....	.....	.....	10	9⅛	10	9¾	9¼	.....	1,213
Bingham Con., g. s.	50	150,000	30	29½	30¼	30	31⅝	30	33¼	32	34⅝	33⅜	34¼	33⅛	10,412
Bonanza	10	300,000	.65	.....	.....	.75	.....	.....	.70	.....	.....	.....	.75	.....	260
British Columbia	5	250,000	.....	.....	5⅛	4⅞	.....	.....	.....	.....	.....	.....	4⅝	4½	290
Cal. & Hecla, c.	25	100,000	525	520	544	523	540	.....	540	.....	540	535	540	.....	121
Centennial, c.	25	90,000	23	22⅝	24	22½	24⅝	23⅝	25¾	24⅜	26⅝	25	.....	.....	22,779
Central Oil	25	60,050	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7⅜	.....	.....
Cochiti	10	182,250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Mercur, g.	5	1,000,000	.....	.....	1⅞	.....	1¾	.....	1⅝	.....	1⅞	.....	1¾	.....	6,522
Continental Zinc	25	22,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper Range Con.	100	285,000	64⅜	63⅜	63⅜	62⅜	65	63¼	65½	.....	66½	64	65¼	64	15,570
Daly-West., g. s.	20	180,000	42⅜	42½	42⅜	42⅛	43	42⅜	42¼	42	42	41⅜	41⅜	36⅜	2,910
Dominion Coal,	100	150,000	.....	.....	.....	.....	130⅜	130½	.....	.....	.....	.....	.....	.....	80
Dominion Coal, pf.	100	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dominion I & S.	100	100,000	57¼	56⅜	57¼	56¾	59	57⅝	58¼	57⅛	58¼	.....	58⅛	57	2,935
Elm River	12	100,000	.....	.....	.....	.....	.....	.....	3	.....	3⅜	3⅛	.....	.....	2,030
Franklin, c.	25	100,000	10½	10⅛	10	.....	10¼	.....	10¼	.....	10½	10⅜	10½	.....	716
Guanajuato Con.	5	385,000	.....	.....	.....	.....	.....	.....	2⅞	.....	3	2⅞	3	2⅞	1,680
Isle Royale Con., c.	25	150,000	11⅝	.....	.....	.....	10½	.....	13	10½	13¼	13	.....	.....	2,240
Mass Con., c.	25	100,000	14½	.....	14⅜	.....	15½	15	15¾	15¼	16⅛	15¾	16	.....	3,743
Mayflower, c.	25	100,000	.....	.....	.....	.....	.....	.....	2⅜	2	2⅜	2	2¼	.....	775
Michigan, c.	25	100,000	.....	.....	9	.....	9¼	.....	.....	.....	10½	10	.....	.....	715
Mohawk, c.	25	100,000	.....	.....	45	44½	46	45	47¾	45⅞	51⅜	49¾	51¾	50	6,022
Mont. Coal & Coke	25	200,000	8½	.....	.....	.....	.....	.....	.....	.....	6½	.....	.....	.....	8,883
Mont'l & Boston, c.	5	570,000	2⅛	2¼	2½	2⅛	2⅜	2⅛	2⅛	2⅛	2¼	2⅛	2¼	2⅛	7,475
National	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Colony, c.	25	100,000	1⅝	.....	1¾	.....	.....	.....	2	.....	2⅜	2	2⅜	2¼	1,495
Old Dominion, c.	25	150,000	18	.....	17¾	.....	19¼	18⅝	19	.....	19¼	19	.....	.....	860
Osceola, c.	25	96,150	61	60	61	.....	62	61	62¾	61⅜	63	62	61	.....	1,580
Parrot, s. c.	10	229,850	27	.....	27	.....	27	26	28¼	28	28¼	27⅛	27¼	.....	497
Phoenix Con., c.	25	100,000	5	.....	5	.....	5	.....	5⅝	5¼	5⅝	5⅜	.....	.....	900
Quincy, c.	25	100,000	115	.....	115	.....	115	.....	114	110	.....	.....	.....	.....	85
Rhode Island, c.	25	100,000	2¾	.....	.....	.....	2⅝	2½	3	2⅝	3	2¾	3¼	3	1,065
Santa Fe, g. c.	10	250,000	⅞	.....	2	.....	2	.....	2½	.....	2⅝	2¼	2½	2¼	4,733
Shannon, c.	10	183,296	11¼	11¼	11⅛	.....	11	.....	.....	.....	11	.....	11	10⅞	895
Tamarack, c.	25	60,000	.....	.....	151	150	149¾	.....	.....	.....	152	149	152	.....	231
Tecumseh	25	90,000	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	50
Trimountain	25	100,000	.....	.....	.....	.....	92	.....	93	.....	92	.....	.....	.....	131
Trinity, c.	25	100,000	11¼	11	11	.....	12	11	11½	11¼	11⅝	11¼	11	10½	3,385
United Copper	100	450,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States, g.	25	250,000	22⅜	21⅞	.....	.....	.....	.....	22⅞	22⅛	23	22⅜	.....	.....	5,173
U. S. Coal & Oil	25	240,000	.....	.....	14	.....	14	.....	14¾	14	14½	14	14½	.....	1,713
Utah Con., g.	5	300,000	23¾	23	†24	23½	25¾	24½	28	25½	28¾	28½	27½	26½	22,468
Victoria, c.	25	100,000	6⅜	.....	6¼	6⅛	6⅞	6¼	6⅝	6¼	6¾	.....	6¾	.....	860
Washington	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	25	.....	.....	.....	100
Winona, c.	25	100,000	6¾	.....	6¾	6¼	7⅛	6¾	8	7¼	8¼	8	8¼	8	12,585
Wolverine, c.	25	60,000	68½	68	69	.....	69¾	69	69	.....	70	69½	69	.....	737
Wyandot	25	100,000	.....	.....	.....	.....	1⅜	.....	.....	.....	1½	1⅜	.....	.....	730

* Boston Stock Exchange. †Ex.-Dividend. Total sales, 183,718 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Jan. 14 H.	Jan. 14 L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 19. H.	Jan. 19. L.	Jan. 20. H.	Jan. 20. L.	Sales
Allis-Chalmers, U. S.	100	19	18⅝	19	18⅛	19	18⅞	.....	.....	.....	.....	19	.....	.....
Allis-Chalm's, pf., U.S.	100	86	85½	86	.....	86	83	86⅝	.....	.....	.....	.....	18⅝	18⅜	900
Am. Agr. Chem., U.S.	100	25	24¾	.....	.....	25	22½	23	.....	.....	25	23	.....	.....	75
Am. Agr. Chem. pf., U.S.	100	90	82	.....	.....	83	82½	83	82	.....	.....	.....	.....	.....	.....
Am. Sm. & Ref., U.S.	100	45	44¾	44½	.....	.....	.....	45	44⅝	44¾	44	44⅝	44	4,830
Am. Sm. & Ref. pf., U.S.	100	93¾	.....	.....	.....	94½	94	94¼	94	.....	.....	92⅞	.....	555
Am. Steel & Fdy., U.S.	100	19⅞	.....	19	.....	.....	.....	.....	.....	.....	.....	19	.....	500
Am. S. & Fdy. pf., U.S.	100	67⅞	.....	67	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Col. Fuel & I., Colo.	100	77½	76	77	76¾	.....	.....	76¾	73	77⅞	76½	73⅜	73¼	6,710
Col. & H. C. & I., Colo.	100	19¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	19⅝	.....	449
Crucible Steel, U. S.	100	19½	19¼	19⅜	.....	.....	.....	.....	.....	19½	19	19¼	19	679
Crucible Steel, pf., U.S.	100	85	.....	85	84½	85	84¾	85	84¼	85	84⅜	85	.....	784
† Mong. R. Coal, Pa.	100	.....	.....	11⅝	.....	.....	.....	.....	.....	.....	.....	11⅜	.....	367
† Mong. R. Coal pf, Pa	100	39½	.....	39½	.....	39¼	.....	39¼	39	39¼	.....	39¼	.....	405
National Lead, U.S.	100	27¼	27	26⅞	26	26½	26	27	.....	.....	.....	.....	.....	1,800
National Lead pf, U.S.	100	92	.....	.....	.....	.....	.....	.....	.....	.....	.....	92	.....	200
† Phila Nat. Gas	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45½	.....	150
† Phila Nat. Gas, pf	100	.....	.....	.....	.....	49	.....	.....	.....	.....	.....	.....	.....	90
† Pittsburg Coal, Pa.	100	29	.....	28	27½	28¾	27¾	28¾	28½	28⅝	28½	28¾	28½	6,645
† Pittsburg Coal pf, Pa	100	90	89½	88¼	88	88¾	88¼	88¾	88¼	.....	.....	88¾	88⅜	655
Republic I & S., U.S.	100	21	20¼	21½	20¼	21¾	21	22½	21⅝	22	21½	21¾	21	21,210
Republic I. & S., pf., U.S.	100	78¼	78⅜	78¼	.....	79¼	78¾	79½	78¾	79	.....	78¾	.....	2,120
Sloss-Shef S. & I., Ala.	100	61½	.....	61⅜	61	62	.....	.....	.....	.....	62⅝	62¾	65	1,500
Sloss-Shef S. & I. pf, Ala.	100	.....	.....	93	.....	93	.....	.....	.....	.....	.....	.....	.....	200
Standard Oil, U.S.	100	747	740	747	745	746	743½	742	740	747	735	740	737	586
Tenn. C. I. & R. R., Ala.	100	62¾	61¼	61⅜	61	62	.....	62½	62	62⅜	62	62	61⅜	5,070
U. S. Red & Ref., U.S.	100	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
U. S. Red & R. pf., U.S.	100	56	.....	56	.....	.....	.....	55½	.....	.....	.....	56	.....	500
U.S. Steel Corp., U.S.	100	37⅝	36⅜	37¼	36⅝	37⅜	36⅞	37⅜	36⅞	37¼	37¼	37⅜	36⅝	60,145
U.S. Steel Corp. pf, U.S.	100	88⅞	88⅜	88⅝	.....	89	88¼	89⅝	89⅛	89¼	89	‡87½	86⅞	33,588
Va.-Car Chem., U.S.	100	63	62	62	61¾	63¼	62¾	63	.....	.....	.....	62¾	62	2,122
Va.-Car Chem. pf, U.S.	100	.....	.....	.....	.....	.....	.....	123	121	.....	.....	122¾	.....	100
Va. I. C. & Coke, U. S.	100	.....	.....	36	35¾	36¼	35½	37	36	36½	.....	36¾	.....	3,435

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡ Ex.-Dividend. Total sales, 504,936 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Jan. 12. H.	Jan. 12. L.	Jan. 13. H.	Jan. 13. L.	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Sales
Acacia	$1	.08½	.08½	.08½	.07½	.09	.07⅝	.09	.07⅜	.08½	.08	.08¾	.08½	1,100
Am. Con.	1	.02¾	.02⅜	.02¾	.02	.02½	.02½	.02½	.02	.04	.....	.02¾	.02	3,000
Anaconda	1	.....	.....	.....	.....	.20	.....	.19	.....	.19	.....	.19	.....	.....
Ben Hur	1	.02	.01⅞	.02	.01⅜	.02¼	.01¾	.02	.....	.02¼	.01¾	.....	.....	2,000
Blue Bell	1	.07¼	.06⅞	.07⅛	.06⅜	.....	.06⅜	.07¼	.06¾	.07½	.06⅜	.07½	.06¾	2,000
C. C. & M.	1	.02½	.02¼	.02¼	.01⅝	.02⅜	.02¼	.02⅜	.02¼	.02⅜	.02¼	.02¾	.02	16,500
C. K. & N.	1	.17	.16	.17	.16	.21	.19	.18	.17	.19½	.19¼	.19¼	.19	23,000
C. C. Con.	1	.05¼	.05½	.05½	.05⅜	.05¾	.05¼	.05½	.05⅜	.05½	.05	.05¾	.04⅞	6,000
Coriolanus	1	.03½	.02¾	.03½	.03	.02½	.02	.....	.....	.03	.02¼	.03	.02¾	.....
Des Moines	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dr. Jack Pot	1	.10	.09⅞	.10	.08¾	.09⅞	.09¾	.09¾	.09⅝	.09⅞	.09½	.10	.09⅝	19,800
Elkton Con.	1	.35⅝	.33	.35⅛	.33	.36	.35⅝	.36	.35	.35	.34¼	.35	.34¼	8,300
El Paso	1	.68¾	.68¼	.68¾	.65	.67	.68	.68¼	.66¾	.69	.68¼	.68	.67½	600
Fannie Rawlings	1	.04¾	.04	.04¾	.04	.05	.04	.04¾	.04	.05	.04	.04¾	.....	.....
Findley	1	.11¼	.10⅜	.11⅜	.10½	.10⅞	.10¼	.10⅝	.10½	.10⅞	.10¼	.11	.10¼	3,000
Gold Dollar Con.	1	.05	.04⅞	.05	.04⅞	.04¾	.04½	.04⅞	.04¾	.04¾	.04¼	.04⅞	.04¾	64,500
Gold King	1	.06	.03½	.05¾	.03½	.....	.....	.....	.....	.40	.35	.....	.....	.....
Golden Cycle	1	.72	.69¾	.72½	.69¾	.72	.69¾	.72	.69¾	.72	.69½	.72	.69	4,000
Golden Fleece	1	.....	.....	.....	.....	.....	.....	.05	.25	.....	.05	.....	.....	.....
Gould	1	.04¾	.04¼	.....	.....	.04¾	.04	.04¾	.03¾	.04¼	.04	.04½	.04	.....
Hart	1	.....	.02½	.02¼	.02	.04	.02½	.04	.02¼	.04	.02½	.04	.02½	.....
Isabella	1	.29½	.29	.29¼	.29	.29	.28½	.29½	.27¼	.29	.27¾	.29	.28	5,500
Jack Pot	1	.10	.09¾	.10	.09¾	.....	.10	.11	.09¾	.....	.09	.12	.08	.....
Last Dollar	1	.....	.50	.30	.70	.....	.....	.....	.....	.70	.....	.70	.....	.....
Lexington	1	.05	.04¾	.05	.04¼	.05	.04⅝	.05	.04¼	.05	.04½	.05	.04½	.....
Little Puck	1	.03⅝	.03½	.03⅝	.03¼	.03	.03⅝	.03⅝	.03¼	.03	.....	.03¼	.03½	3,000
Mollie Gibson	1	.06	.05¾	.06	.05¼	.06¼	.05¾

STOCK QUOTATIONS.

MEXICO*. Jan. 10.

Name of Company	Shares Issued	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca.Min. de Penotes	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	10,000	30,000
Guanajuato.				
Angustias Pozos	2,400	5.00	103	107
Cinco Senores y An., aviadoras	2,000	15.00	273	275
Cinco Senores y An., aviada	400	10.00	250	265
Providencia, SanJuan de la Luz	6,000	2.00	210	215
Queensland y Australia	300	.....	130	140
Guerrero.				
Garduno y Anexas	7,200	.....	30	50
Hidalgo.				
Amistad y Concordia	9,600	3.48	76	77
Carmen, aviada	1,100	.....	140	150
Guadalupe Fresnillo mill	1,000	.....	220	300
Guadalupe Fresnillo Mine	1,400	.....	90	110
La Blanca, aviadora	1,536	.....	900	930
La Blanca, aviada	768	.....	600	620
La Reina y An., aviadora	5,600	.....	20	22
Maravillas y An., aviador	1,680	.....	150	180
Maravillas el Lobo	1,000	.....	150	180
Palma y An., aviador	1,800	.....	9	12
Real del Monte	2,554	.....	750	800
Santa Ana y An., aviadora	1,800	.....	30	35
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80	81
Santo Tomas Apostol aviadoras	5,100	.....	3	4
San Felipe de Jesus, aviadora	3,600	.....	43	46
San Felipe de Jesus, aviada	1,200	.....	15	20
San Rafael y An., Trompillo	1,200	12.00	910	920
San Rafael y An., aviada	1,200	$4.00	$395	$400
Soledad, aviada	960	5.00	345	355
Sorpresa, aviada	960	5.00	275	280
Mexico.				
Alacran	2,400	.....	30	40
Buen Despacho	3,000	.....	78	82
Dos Estrellas	3,000	30.00	2,240	2,260
La Esperanza (El Oro)	3,000	10.00	1,150	1,170
La Refornia, aviadores	2,000	.....	59	62
Santa Ana, Esperanza	2,400	.....	80	96
Michoacan.				
Luz de Borda, aviadora	3,000	.....	50	55
Luz de Borda, aviada	1,000	.....	12	15
San Luis Potosi.				
Concepcion y An.	3,000	.....	75	85
El Barreno, aviadora	2,000	2.00	55	57
Sta. Maria de la Paz	2,400	10.00	750	765
San Diego y Annexas	2,400	4.00	48	50
Zacatecas.				
Asturiana y An.	2,500	.....	45	55
Candelaria y Pinos	2,500	.....	225	275
Esperanza y An.	2,400	.....	65	75
Lourdes	2,500	.....	45	55
Luz de Minillas, pagadoras	2,000	.....	25	30
San Carlos y Annexas	2,500	10.00	170	180
Sta. Maria de Gaud.	2,500	10.00	135	145
Miscellaneous.				
Bartolome de Medina	2,000	3.00	73	78
Guadalupe Hacienda	10,000	2.00	260	270
La Luz Hac. (Pachuca)	3,750	.....	230	240
La Reina (Chihuahua)	192	.....	2,500	3,500
Naica (Chihuahua)	100	.....	6,000	.....
Natividad (Oaxaca) aviadora	1,800	4.00	550	650
National (Oaxaca) aviadas	600	4.00	.....	.....
San Francisco Hac.	6,000	1.00	.....	73
Santa Ana Huantla Morelos	4,000	.....	50	70
Union Hacienda	3,000	5.00	290	295

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	January. 19.	January. 20.	Name of Company.	January. 19.	January. 20.
Belcher	.43	.72	Justice	.12	.12
Best & Belcher	1.50	1.95	Mexican	1.40	1.50
Caledonia	2.30	2.35	Occidental Con	.48	.48
Challenge Con	.36	.40	Ophir	1.90	1.85
Chollar	.27	.35	Overman	.62	.65
Confidence	.90	1.10	Potosi	.41	.44
Con. Cal. & Va	1.85	1.85	Savage	.36	.35
Con. Imperial	.03	.03	Sierra Nevada	.89	.97
Crown Point	.37	.42	Union Con	1.00	1.05
Gould & Curry	.64	.57	Utah Con	.42	.40
Hale & Norcross	.70	.79	Yellow Jacket	.36	.45

SALT LAKE CITY.* Jan. 16.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.32½	.30	6,400
Ben Butler	500,000	1	.08½	.07½	6,400
Bullion-Beck	100,000	10	.....	.....	.....
California	300,000	1	.27½	.22½	26,700
Carisa	500,000	1	.17½	.17	3,100
Century	150,000	1	.80½	.90	1,800
Con. Mercur	1,000,000	5	1.71	1.67	6,700
Daly	.....	.....	2.75	2 20	4,988
Daly-Judge	300,000	1	10.45	10.12½	4,225
Daly-West	150,000	20	44.20	42.00	810
Grand Central	250,000	1	5.50	5.40	300
L. Mammoth	150,000	1	.70	.64	5,400
La Reine	.....	.....	.04½	.04½	4,000
M. Washington	.....	.....	.03½	.03½	2,000
Mammoth	400,000	25	.....	.....	.....
May Day	400,000	.25	.17½	.17	4,750
N. Y. Bonanza	.....	.....	.31½	.24	39,350
Ontario	150,000	100	.....	.....	.....
Sacramento	1,000,000	5	.29½	.25	11,400
Star Con	500,000	1	.13	.13	200
So. Swansea	300,000	1	.....	.....	.....
Sunshine	250,000	10	.12	.10	855
Uncle Sam, Con	500,000	1	.23½	.22	1,100
Victor	500,000	1	.10½	.09½	1,100
Wabash	.....	.....	.44½	.30¼	16,300
Yankee Con	500,000	1	.45	.43	600

All mines are in Utah. *By our Special Correspondent. Total sales, 142,556 shares.

ST. LOUIS, MO.* Jan. 17

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Capita Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie Colo	$3,000,000	$10	$0.70	$0.80	Columbia Lead, Mo.	500,000	10	11.00	12 00
Catherine Lead, Mo.	500,000	10	3.00	4.00	Con. Coal, Ill.	500,000	100	20.50	21.50
Central Coal & C.	1,875,000	100	68.50	67.50	Doe Run Lead Co.	1,500,000	100	125.00	135.00
Central C. & C., pf.	1,875,000	100	.....	.....	Granite Bimet., Mt.	1,000,000	10	1.05	1.15
Central Lead, Mo.	1,000,000	10	130.00	135.00	St. Joe Lead, Mo.	6,000,000	10	14.00	17.00

*From our Special Correspon de nt.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 19. H.	Jan. 19. L.	Jan. 20. H.	Jan. 20. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	8½	.....	8¼	.....	8½	.....	.....	.....	.....	.....	8 1/16	8⅝	845
Cambria Iron, Pa.	50	45	.....	48¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
Cambria Steel, Pa.	50	26	.....	26	25⅞	26	.....	26½	26	.....	.....	26⅛	26	2,957
Penn. Steel, pfd.	100	91	90½	92¾	92½	92½	.....	92¼	.....	92½	.....	.....	.....	440
Susq. I. & S., Pa.	5	2 1/16	2⅜	2¾	.....	.....	.....	2¼	.....	2 1/16	.....	.....	.....	40
United Gas I., Pa.	50	114	113½	113¾	.....	113	.....	113	.....	113⅜	113¼	112¼	112½	730
Warwick I. & Steel	10	5 3/16	.....	5¼	.....	5 3/16	5¼	.....	.....	.....	.....	5 1/16	.....	80

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 6,216 shares.

LONDON. Jan. 9.

Name and Country of Company	Authorized Capital.	Par value.	Last dividend. Amt.	Last dividend. Date	Quotations. Buyers.	Quotations. Sellers.
	£	£. s. d.	s. d.		£. s. d.	£. s. d.
Alaska-Treadwell, g., Alaska	1,000,000	5 0 0	1 6	Jan., 1902	4 7 6	4 12 6
Anaconda, c. s., Montana	6,000,000	5 0 0	2 0	Nov., 1902	4 17 6	5 0 0
Arizona, c., Def., ord	63,444	1 0 0	4 0	July, 1901	7 5 0	7 15 0
Arizona, pref., ord	316,530	1 0 0	4 0	July, 1902	7 10 0	7 15 0
Arizona, Cum., pfd	316,530	1 0 0	£7	Nov., 1902	128 0 0	133 0 0
Camp Bird, g., Colo	1,000,000	1 0 0	0 7½	Dec., 1902	1 8 6	1 9 6
Copiapo, c., Chile	225,000	2 0 0	2 6	Dec., 1901	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	13 9	16 3
Enterprise, g., British Col	200,000	1 0 0			2 6	7 6
El Oro, g Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 5 0	1 7 6
Frontino & Bolivia, g., Colombia	140,000	1 0 0	3 0	July, 1901	17 6	1 0 0
Hall Mg. & Sm., c. s., British Col	325,000	1 0 0	1 0	May, 1898	1 6	2 0
Le Roi, g., British Col	1,000,000	5 0 0	5 0	Nov., 1899	1 5 0	1 7 6
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	17 6	1 0 0
Mesquital, Mexico	250,000	2 0	rts.	July, 1902	4 0	5 0
Montana, g. s., Montana	660,000	1 0 0	6	April, 1898	2 0	2 6
Mountain, c., Cal	1,250,000	5 0 0	5 0	April, 1902	3 2 6	3 7 6
Frontino & Bolivia, g., Colombia	1,100,000	1 0 0	6	April, 1902	7 6	8 8
St. John del Rey., g., Brazil	600,000	1 0 0	6	Dec., 1902	15 0	16 0
Utah Con., g., (High. Boy), Utah	300,000	1 0 0	5 0	Dec., 1901	4 15 0	5 5 0
Ymir, g., British Col.	200,000	1 0 0	1 0	Mar., 1902	12 6	15 0
European:						
Linares, l., Spain	45,000	3 0 0	9	Oct., 1902	2 5 0	2 15 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 7 6	3 12 6
Rio Tinto, c., Spain	1,625,000	5 0 0	22 6	Nov., 1902	42 12 6	42 17
Rio Tinto, pref., Spain	1,625,000	5 0 0	2 6	Nov., 1902	6 0 0	6 5
Tharsis, c., Spain	1,250,000	2 0 0	8 0	May, 1902	4 5 0	4 7
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	500,000	1 0 0	1 6	Jan., 1900	1 12 6	1 13 9
Brisc'a, Tin, Tasmania	600,000	1 0 0	.....		10 8	11 6
Broken Hill Pr'p., s., N. S. Wales	394,000	1 8 0	1 0	Aug., 1902	1 11 6	1 12
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	17 0	18 0
Fingall Reefs, Ext., g., W. Australia	149,150	1 0 0	.....		2 6	3 0
Golden Horse Shoe, W. Australia	360,000	5 0 0	6 0	Nov, 1902	9 10 0	9 12 6
Great Bo'd'r Pr'p., W. Australia	175,000	2 0	6	Oct., 1902	19 0	19 6
Ivanhoe Gold Corp. W. Australia	1,000,000	5 0 0	4 0	Oct., 1902	7 10 0	7 12 6
Kalgurlie, g., W. Australia	120,000	1 0 0	2 6	Oct., 1902	3 13 9	3 16
Lake View Cons., g., W. Australia	250,000	1 0 0	5 0	Nov., 1901	2 7 6	2 10
Mt. Lyell M. & R., c., Tasmania	825,000	3 0 0	1 0	Dec., 1902	2 11 3	2 13
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Jan., 1902	3 17 6	4 2
Waihi, g., New Zealand	497,412	1 0 0	2 6	Dec., 1902	4 18 9	5 1
Indian:						
Champion Reef, g., Colar Fields	236,500	10 0	2 0	Sept., 1902	6 16 3	6 18
Mysore Gold, Colar Fields	265,000	10 0	4 0	Nov., 1902	6 17 6	7 0
Nundydroog, g., Colar Fields	242,000	10 0	1 3	Nov., 1902	2 0 0	2 2 6
Ooregum, g., Colar Fields	171,500	10 0	1 3	Dec., 1902	1 11 3	1 13 9
Ooregum, pref., g., Colar Fields	120,000	10 0	1 3	Dec., 1902	2 0 0	2 2 6
African:						
Angelo, g, Transvaal	275,000	1 0 0	8 0	June, 1902	7 7 6	7 12 6
British S. Africa, chartered S. Africa	5,000,000	1 0 0	rts.	May, 1899	3 7 6	3 10 0
Cape Copper, S. Africa	600,000	2 0 0	2 3	Dec., 1902	2 10 0	2 15 0
Cape Copper, pref., S. Africa	150,000	2 0 0	2 3	Dec., 1902	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	1,360,000	4 0 0	3 0	Aug., 1899	6 12 9	6 16 3
Crown Reef, g., Transvaal	120,000	1 0 0	10 0	Oct., 1902	17 10 0	18 0 0
De Beers Con., d., pref., Cape Colony	2,000,000	2 10 0	10 0	Jan., 1903	19 10 0	19 12 6
De Beers Con., def	2,100,000	2 10 0	12 6	Jan., 1903	22 2 6	22 5 0
East Rand, Mg. Transvaal	400,000	1 0 0	.....	.....	5 10 0	5 12 6
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	8 5 0	8 6 3
Ferreira g., Transvaal	90,000	1 0 0	10 0	Jan., 1902	24 0 0	24 10 0
Geldenhuis Est., g., Transvaal	300,000	1 0 0	5 0	Aug., 1902	6 17 6	7 2 6
Geduld, g., Transvaal	400,000	1 0 0	rts.	May, 1902	7 5 0	7 7 6
Goldfields, Matabeleland	300,000	1 0 0	2 0	May, 1902	1 2 6	1 5 0
Henry Nourse, g., Transvaal	125,000	1 0 0	10 0	June, 1899	9 7 6	9 12 6
Jagersfontein, d., Orange F. S	1,000,000	5 0 0	6 0	Nov., 1899	27 2 6	27 7 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	July, 1899	5 15 0	6 5 0
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 2 6	4 5 0
May Con., g., Transvaal	200,000	1 0 0	3 0	Feb., 1902	4 12 6	4 15 0
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Aug., 1902	5 17 6	6 2 6
Namaqua, c., Cape Colony	200,000	2 0 0	2 0	June, 1902	2 15 0	3 0 0
Primrose (New), g., Transvaal	300,000	1 0 0	6 0	Aug., 1899	4 0 0	4 2 6
Rand Mines, g., S. Africa	448,989	5 0 0	4 0	Aug., 1902	11 0 0	11 1 3
Robinson, g., Transvaal	2,750,000	5 0 0	6 0	Jan., 1903	11 5 0	11 7 6
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 10 0	5 12 6
Salisbury, g., Transvaal	93,000	1 0 0	2 0	Mar., 1899	2 15 0	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 5 0	1 7 6
Wemmer, Transvaal	80,000	1 0 0	15	July, 1902	13 15 0	14 5 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Jan. 13. £.	Jan. 13. s.	Jan. 13. d.	Jan. 20. £.	Jan. 20. s.	Jan. 20. d.	Name of Company	Jan. 13. £.	Jan. 13. s.	Jan. 13. d.	Jan. 20. £.	Jan. 20. s.	Jan. 20. d.
Anaconda	5	0	0	5	0	0	Jagersfontien	27	5	0	27	5	0
British South Africa	3	12	6	3	8	9	Johannesburg Invest	3	12	6	2	10	0
Camp Bird	.....			1	13	0	Modderfontein	.....			10	18	9
Con. Gold-Fields	8	5	0	8	1	3	Rand Mines	11	8	9	11	2	6
De Beers Con. def	22	10	0	22	5	0	Rio Tinto com	43	2	6	42	17	6
East Rand	.....			8	7	8	Simmer & Jack	.....			1	17	6
Geduld	.....			7	10	0							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Jan. 7.

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Boleo	Lower Cal.	Copper	.....	500	176.00	950.00	1,147.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	24.00	24.00
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	89.00	89.00
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	438.00	450.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	10.00	445.00	445.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	1.25	1.00
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	575.00	588.00

TORONTO, ONT.* Jan. 19.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.08	.05	.....	Granby Smelter	$100	375	325	.....
Cariboo (Mc. K.)	1	.18½	.17	1,500	Mountain Lion	1	.15	.11	.....
Cariboo (Hyd.)	1	.75	.34	500	North Star	1	.13	.09	.....
Center Star	1	.37½	.34	500	Nova Scotia Steel, com	100	111	108½	.....
Crows Nest, C.	100	400	300	.....	Payne	1	.12	.07	.....
Dominion Coal, com.	100	133	130½	.....	Rambler Cariboo	1	.37	.30	.....
Dominion S. & I.	100	59	55½	.....	Republic	1	.09	.06	.....
Dominion S. & I., pref.	100	.....	.....	.....	St. Eugene	1	.28	.21	.....
Fairview	1	.01¼	.02¾	5,000	Virtue	1	.08	.04	.....
Giant	1	.03¾	.02¾	1,000	War Eagle Con	1	.19½	.17	2,000

*Standard Stock and Mining Exchange. Total sales 9,500 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust. Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.		.07½@09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Boston, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.03½
Crude, ex-ship N. Y.: Abbett (Turkey)	lg.ton	26.50@30.00
Kulnk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. powd.	lb.	.01@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.80
Steel Emery, f.o.b. Pittsburg.	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas		.12½
Chromic, crude		.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.43@2.45
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.80
Powdered	"	2.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.00
Sulphate, pure	"	1.50@2.00
Com'l	"	1.15@2.00
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07¼@.08¼
Powdered	"	.08½@.09
Muriate	"	.05¾
Lump	"	.06¼
Nitrate, white, pure (98%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 98%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.02¾@.03½
Red	"	.06¾@.07
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01¼@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.02
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	28.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.67½@1.76
Chem. pure cryst.	lb.	.05
Nitrate, powdered	"	.05½

BARIUM	Cust. Meas.	Price.
Oxide, Am. hyd. cryst.	lb.	$0.03¾
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	1.40
Subcarbonate	"	1.65
BITUMEN—"B"	"	.03¼
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE	"	.40
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.50
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs.	"	.75
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.12½
White	"	.13½
CHALK—Lump, bulk	sh.ton	2.50
Ppt. per quality	lb.	.03¾@.06
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.00
Am. best, ex-dock, N. Y.	"	9.00
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.06
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.20@2.30
Gray	"	2.30@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.37½
In bbls.	"	.42½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.25
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (30% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro, (32-2-10° Ba.)		.18¾@18¾
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.80
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—Lump	100 lbs.	.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust. Meas. sh.ton	Price. $8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.06
Italian, pulv	"	.01¼
GYPSUM—Ground	sh.ton	8.00@8.50
Fertiliser	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	30.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.07¾@.08
Brown	"	.06@.06¼
Nitrate, com'l	"	.06½
" gran.	"	.03¼
LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90
MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01¼@.02½
85@90% binoxide	"	.02¾@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.20
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00¾@.02
Sheets, N. C., 2x4 in.	"	.20
3x3 in.	"	.30
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 20 gr.: 25@30, cold test	gal.	.10½@.11
15, cold test	"	.11½@.12
Zero	"	.12½@.13½
Summer	"	.10@.11½
Cylinder, dark steam ref.	"	.09¾@.11½
Dark, filtered	"	.14½@.17
Light, filtered	"	.15½@.18½
Extra cold test	"	.22½@.27
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°	bbl.	9.05
"Stove"	gal.	.12
Linseed, domestic raw	"	.45@.46
Boiled	"	.48
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.05
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd.	"	.04¾@.05¼
English flake	"	.06¾@.08½
Glassmakers'	"	.07¼@.08

PAINTS AND COLORS—	Cust. Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	18.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01¾
Orange mineral, Am.	"	.07¾@.08
Foreign, as to make	"	.08½@.11¼
Paris green, pure, bulk	"	.10¾@.11
Red lead, American	"	.05¾@.06
Foreign	"	.06¾@.08
Turpentine, spirits	gal.	.59½@.60
White lead, Am., dry	lb.	.04½@.04¾
American, in oil	"	.05½@.05¾
Foreign, in oil	"	.06¾@.06½
Zinc, white, Am., ex dry.	"	.04¾@.04¾
American, red seal	"	.06½
Green seal	"	.07
Foreign, red seal, dry	"	.05¾@.06½
Green seal, dry	"	.06½@.09½
POTASH		
Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.03½
Powdered or gran.	"	.14
Bichromate, Am.	"	.03½@.03¾
Scotch	"	.03½@.03
Carbonate (80@85%)	"	.02¾@.03
Chromate	"	.35
Cyanide (98@99%)	"	.20@.21½
Kainit	lg.ton	9.05
Manure salt, 20%	100 lbs.	.96
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.82
95%	"	1.90
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13@.13¼
Red	"	.32
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvinit	unit	.20½
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs.	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100 lbs.	3.60@3.75
Refined	"	4.25@4.62½
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quarts, ord.	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quarts	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate	"	.53
Oxide	"	.85@1.10
SODIUM—		
Bichromate	lb.	.06¼
Chlorate, com'l	"	.07@.07¾
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Peroxide	lb.	.45
Phosphate	"	.02¼@.02½
Prussiate	"	.09¾
Silicate, conc.	"	.03
Com'l	"	.01
Sulphate, com'l	100 lb.	.75@.82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.03½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	18.75
N. Y., Fibrous, best		10.00
French, best	100 lbs.	1.35
Italian, best	"	1.62½
TAR—Regular	bbl.	3.50
Oil barrels	"	4.20
TIN—Crystals	lb.	.23
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt.	"	.08
Chloride solution, com'l	"	.02½
Chloride granular	"	.04¼@.04¾
Dust	"	.04¾@.04½
Sulphate	"	.02¾@.03¼

THE RARE EARTHS.

	Cust. Meas.	Price.
BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	15.00
DIDYMIUM—Nitrate	"	25.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	25.00
LITHIUM—Nitrate	oz.	.35
STRONTIUM—Nitrate	lb.	.07@.07¾
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.35
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	3.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.